TANGANYIKA TERRITORY

DEPARTMENT OF AGRICULTURE

ANNUAL REPORT

1946

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SECTION I.—GENERAL REVIEW OF THE YEAR

The Territory again experienced a year of most unfavourable weather, with rainfall considerably below the average in most areas, and distribution generally unfavourable for crop production. In that part of the Territory enjoying two rainy seasons the short rains were virtually a failure, and the long rains were either too sporadic or were concentrated into too short a period. Elsewhere in the Territory, characterized by only one rainy season, conditions were in many cases even worse. The Lake, Western and Central Provinces received promising rains at the beginning of the season but these were followed by prolonged dry spells in January, February and March which in some areas proved disastrous. The Southern Highlands Province also suffered a prolonged dry spell, in addition to a late start in the rains and patchy and insufficient precipitation in the latter half of the season. In the Southern Province the coastal belt experienced the lowest rainfall on record, though further inland conditions were less severe, and in Songea were up to average.

NON-NATIVE AGRICULTURE

Estate agriculture had to contend with many difficulties during 1946 including very unfavourable weather, a serious shortage of labour, and the continued scarcity of agricultural machinery and equipment. Due to these factors the output of the various estate crops was in most cases lower than in 1945 with marked decreases in sisal, coffee and flue-cured tobacco. The output of sisal had achieved record proportions in 1944 and 1945, but the weather and the labour position handicapped the 1946 production, and exports declined by more than 5,000 tons. In the case of estate coffee it was the extremely dry season which was mainly responsible for a crop equal to only a quarter of that harvested in the previous year. A falling off in 1945 in the local demand for flue-cured tobacco resulted in a considerable reduction of the acreage planted, so that this factor added to the adverse effects of a poor season and a yield of approximately 500,000 lbs. less leaf than that obtained during the two previous years was harvested. Pyrethrum production also showed a decline, but the output was only slightly lower than the previous year's record total, because increased plantings in the Southern Highlands compensated for the poor crop harvested in the Northern Province. The production of tea, papain and seed beans, though influenced by the weather, was in each case a record one on account of the increased acreages which have been planted to these crops.

In the production of food crops non-native agriculture contributed a valuable share towards the tonnage of maize, wheat and beans which was harvested in 1946. This production was encouraged by a continuation of Government's policy of offering maize grants, breaking grants, of guaranteeing minimum returns, and of making available crop and machinery loans. It may be mentioned that in the disbursement of these loans and grants Government was greatly assisted by the advice and recommendations tendered by the various District Production Committees.

NATIVE AGRICULTURE

In respect of native grown crops 1946 was a year of disappointing harvests and of actual hardships. Food shortages were experienced in every Province of the Territory and in some cases these shortages deteriorated into famines requiring Government assistance in the issue of famine relief. The areas in which these famines occurred included parts of the Central Province and parts of the Mbulu, Shinyanga and Rufiji Districts. Other areas of food shortage, though not sufficiently serious to receive organized famine relief, nevertheless suffered great hardships.

All the grain crops suffered to a greater or less degree from the insufficient and poorly distributed rainfall. The paddy crop was probably the most seriously affected and maize fared little better except in a few favourable areas. Even sorghum and millets, the most drought-resistant of the grain crops, were in some cases virtual failures, supplying food sufficient for only two to five months. Pulses generally yielded poor crops. Root crops, however, were invaluable where sufficient reserves existed and every effort was made to enforce the replenishment of these reserves, though in some areas a shortage of planting material or unfavourable weather prevented the desired acreage being established.

Cash crops produced varying results. Cotton in the Lake Province was only slightly below the average for the past seven years; elsewhere, excepting for the very poor yields in the Southern Province, the crop was better than in 1945. Tobacco in the Songea District was also satisfactory in comparison with recent crops and in other areas there has been an increase in the production of roll tobacco. Coffee on the other hand suffered a severe set-back and the Bukoba crop in particular was one of the poorest for many years. Similarly around Kilimanjaro only the high altitude coffee plantings situated in the rain belt escaped the heavy reduction in yields caused by the dry weather. Oil seeds were only available on a reduced scale, the Southern Province sesame crop being merely fair and the Territorial production of groundnuts being the lowest on record. Consequent on the poor harvests of food and cash crops there was naturally a greater resort to the collection of wild products such as beeswax, gum, castor seed and colombo root, although in the case of gum the total exports were slightly lower than for the previous two years.

LABOUR

The supply of labour during 1946 was again inadequate particularly in the case of sisal and coffee estate requirements. The situation deteriorated steadily with the increasing demands of plantation industries, tsetse clearings, public and other works. Towards the end of the year the position was reviewed and legislation was drafted to ensure the proper utilization of labour. At the same

time the restriction of the acreages of new plantings of such crops as papaw, coffee, tobacco, pyrethrum, sisal and tea was continued in order that a maximum labour force for carrying out the increased food production plan could be maintained.

MARKETING

The marketing of most agricultural produce continued under the systems of guaranteed prices. Sisal was purchased by the Sisal Controller on behalf of the Board of Trade, and as from 1st April, 1946, the price of £30 per ton for No. 1 grade was increased to £48 9s. with similar increases in respect of all the other grades. Cotton was also purchased on behalf of the Board of Trade and under agreement with India. Prices in the case of cotton appreciated to the extent of 7½ cents per pound of lint f.o.b. for Lake Province cotton, and 6 cents per pound for Central Line cotton for the United Kingdom deliveries or 3½ cents for deliveries to India. The effect of this on the price received by the African producer was an increase from 14 cents to 15 cents per pound of seed cotton in the Lake Province and from 32 cents to 37 cents per kilogramme in the rest of the Territory.

Of the grain crops maize was purchased by the Produce Controller at the guaranteed price of Shs. 13/50 per 200 lbs. bag, and the Northern Province wheat was marketed through the Kenya Farmers Association, or their sub-agents the Northern Province Wheat Grower's Association and the Kilimanjaro Native Co-operative Union, at the guaranteed price of Shs. 27/50 per bag for the non-native crop, and Shs. 22/- per bag for fair average quality native grown wheat.

The mild coffee crop produced by non-native growers remained under control and was disposed of to the Ministry of Food the average receipts being Shs. 104/05 per cwt. a decrease of Shs. 1/20 per cwt. from 1945. The Bukoba coffee crop which includes both native grown sun dried Robusta and Arabica was marketed through the Bukoba Coffee Control Board operating on behalf of Government and selling to the Ministry of Food, at the agreed price of £65 per ton f.o.b. for Plantation (Arabica) F.A.Q. and £54 per ton for Native (Robusta) F.A.Q. Negotiations were taking place towards the end of the year in regard to the conclusion of a five year contract with the Ministry of Food for the purchase of the mild coffee output and a substantial proportion of the native coffee production.

The market for flue-cured tobacco recovered strongly and no difficulty was experienced ultimately in disposing of the crop to East African tobacco factories. Some of the better grades were exported to the United Kingdom. Inferior qualities and scrap tobacco found a ready sale to Middle East outlets.

The other important tobacco crop, the fire cured leaf produced by the Nogni-Matengo Co-operative Marketing Union was marketed in the normal way, part being reserved for export and the balance to local factories.

Native Authority produce markets functioned fairly satisfactorily during the year, though a fair proportion of the food crops found its way into the more lucrative "black market".

The marketing of the Muhesa orange crop was carried out on behalf of the Native Authority by the appointed agents (Messrs. Dalgety & Co.) and this arrangement continued to function in a most satisfactory manner.

SOIL CONSERVATION

Slow but steady progress in obtaining the adoption of soil conservation measures is reported from all Provinces. Propaganda and demonstration of what is required to arrest or reduce the damage due to soil erosion is part of the regular duties of the field staff, but constant pressure has to be applied to obtain the adoption and the maintenance of the necessary soil conservation measures. These measures vary over the different regions and satisfactory progress has been achieved in many areas during the past year in the adoption of tie-ridging and contour banking. In the Central Province a wide scale campaign employing a large field staff of Instructors using upwards of a hundred striding levels marked out contour lines on a great number of fields, supervising and enforcing at the same time the construction of contour banks by the individual cultivator. In the Lake Province tie-ridging is being encouraged, and in parts of the Musoma District this measure has now become an established practice. As a first stage in having this measure adopted in Sukumaland, Native Authority rules have been enacted requiring each homestead to have at least half an acre tie-ridged, but progress in enforcing this is as yet slow.

Contour hedging is at present the principle soil conservation measure in most of the mountain areas and a further many hundreds of miles of various types of hedging have been established in the Usambaras, Ulugurus, Kilimanjaro and in Bugufi. The use of bananas rather than Kuskus (*Vetiveria zizanoides*) as a contour hedge is being tried in the Ulugurus, as such a plant has the additional advantage of being a food crop and the cut stems laid behind the contour line of bananas should prove a more effective barrier against soil wash.

Although contour hedging is of value, such a measure by itself is not sufficient to ensure the protection or the rehabilitation of such badly eroded and over populated areas as are found in parts of the Usambaras, and in order to work out the most suitable system for regenerating soil and cover in these areas an investigation centre, in charge of an Agricultural Officer, has been set up in the Mlalo Basin (Lushoto District). The cost of this investigation scheme will be approximately £15,000 spread over a period of five years and certain progress has already been made in establishing this centre and carrying out preliminary surveys.

In some areas the population density is far too high for the type of soil and climate obtaining and ordinary soil conservation, measures would be quite inadequate if no attempt were made at the same time to reduce the human and stock population. One such area is the Irangi Plateau of the Kondoa Irangi District, where extreme "bad land" conditions already prevail. The reduction of the population was an urgent measure if further destruction was to be arrested and Government approved certain Native Authority rules which provided for the movement of a proportion of the stock and human population off the Plateau to other areas. A suitable reception area was in fact made available along the eastern fan-slopes of the plateau by clearing tsetse fly infested bush, thus serving the additional purpose of interposing a barrier against the threatened encroachment of fly on to the plateau. Bush clearing was completed in 1946 and it was hoped to move 1,000 families during the year; but the plan had to be postponed on account of the non-arrival of the very essential water piping with which to provide the new settlers with domestic water.

LOCUSTS

Desert Locusts were active in the northern part of the Territory during the first half of the year. A full-scale hopper poisoning campaign was already in progress at the beginning of the year in the Pares and Usambaras, and was completed early in February. Shortly afterwards immature flying locusts appeared from the north and north-east and caused extensive damage in the South Pares and in the mountains of the West Usambaras. Fortunately this invasion faded out before the long rain crops were sufficiently advanced to suffer severe damage. In the Northern Province extensive hatchings occurred early in May in the Loliondo, Longido and Engaruka areas, but the bulk of these were destroyed, as was a small infestation in the Mwika and Rombo section of Kilimanjaro. The Central and Western Provinces reported several swarms of Desert Locust in February, March and April, but although slight damage was done to crops, no egg laying occurred.

At the end of the year an invasion of Desert Locusts was again feared, and although various swarms were reported, some as far south as Manyoni and north Dodoma, the threatened invasion did not materialize.

A few Red Locust swarms were reported in the Western Province, the only known egg laying being by a small swarm south of Usinge. The infestation was quickly destroyed and no damage was reported.

PESTS AND DISEASES

The cotton crop in the Lake Province was remarkably free from cotton pests during the past very dry season and the same can be said to have applied in the case of the other cotton areas. The discovery of the red bollworm in the Southern Province is, however, very disturbing as it might prove to be a serious threat to the cotton industry in the rest of the Territory and beyond, and in order to isolate this pest the drastic step has been taken of prohibiting, as from 1947, the growing of cotton in the Kilwa and Liwale Districts and the northern parts of Lindi and Masasi.

In the case of coffee the dry weather favoured the increase of various pests, so that thrips and leaf miner in the Northern Province and *Stephanoderes* in Bukoba were on a much more active scale. Sanitation measures against white stem borer and *Antestia* were tightened up in the Northern Province.

There was a severe infestation of banana weevil in the Kilimanjaro area which caused heavy damage to drought affected bananas. Rules for the control of this pest were approved and brought into force towards the end of the year. Another type of weevil was reported to have caused great damage to sweet potatoes and completely destroyed part of the Mgeta (Ulanga) Sleeping Sickness Settlement's sweet potato crop, forcing the people in that area to move elsewhere in the settlement.

The coconut beetle continues to menace coconut plantings all along the coast, but shortage of staff makes it difficult to enforce the sanitation measures on a wide enough scale for them to be really effective. In the Northern Rufiji, for instance, continued neglect to keep down undergrowth has resulted in a serious outbreak of this beetle.

Pests of maize and millet crops included the usual infestation of stalk borer and damage from cut-worm. Army worm and *Marasmia* also caused a certain amount of damage. Wheat on the other hand was remarkably free

of pests during the past season. Striga continues to be serious on grain crops in the Lake Province and the various up-rooting campaigns functioned with varying success, the best being in the Maswa District which has a regular "Striga day" once a week.

Other pests included onion thrips, which caused great damage in a dry year such as was experienced in 1946; elegant grasshoppers, serious in parts of the Northern and Western Provinces; cut worm in beans, and an increase in nematodes in the tobacco areas in the Iringa District.

Amongst the diseases, Irish blight (*Phytophthora infestans*) is at present one of the most serious, having been particularly disastrous in its effects on the Usambara potato crop. 1946, however, with its very dry climate has been unfavourable to blight with a corresponding benefit to potatoes.

The only other serious diseases reported were red rust in the Biharamulo tobacco crop, and a certain amount of grain and loose smut in the sorghum crop in the Central Province. *Hemeleia* in coffee and wheat rusts appear to have been of very minor importance.

Vermin in the shape of baboon, pig, various antelopes and elephant has taken its annual toll, particularly in areas where the population is scattered and the intervening bush provides ample cover and makes any concerted hunting very difficult. The grouping of cassava plots into communally fenced blocks is being encouraged in the Tanga Province as the labour expended on fencing is thus greatly reduced.

EXPORT CROP FIGURES

The following table shows the principal exports of the territory since 1939 with the value of those for 1946

	Maximum output for export prior to 1946		1939	1940	1941	1942	1943	1944	1945	1946		
			Amount	Amount	Amount	Amount	Amount	Amount	Amount	Amount	Total Value	Value per ton f.o.b.
	Year	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	£	£
Sisal	1942	136,237	93,110	78,528	75,195	136,237	96,598	111,848	110,637	111,521	3,916,405	35— 2
Sisal (manufactured) ...	1936	2,325	—	5	15	26	30	8	—	—	—	—
Cotton Lint	1941	13,106	11,633	10,624	13,106	8,009	7,002	5,944	7,192	3,958	376,310	96—15
Coffee	1935	18,588	16,599	15,634	13,667	14,828	10,898	15,561	14,441	10,021	675,580	64— 8
Groundnuts	1936	22,786	4,496	8,185	11,312	13,193	1,752	627	955	475	7,736	16— 6
Hides and Skins ...	1939	4,286	4,286	3,946	3,512	2,993	2,339	2,871	2,259	3,527	205,503	58— 5
Copra	1928	9,318	6,378	3,095	3,620	3,700	2,816	1,368	5	312	6,371	20— 8
Sesame	1938	5,241	4,639	2,052	3,018	3,563	3,180	1,712	1,441	929	15,703	16—18
Rice	1941	17,965	9,901	15,204	17,965	17,948	4,673	4,494	2,171	70	1,267	18— 2
Millet and Mtama ...	1928	7,732	7,181	4,514	3,280	3,348	913	1,501	3,804	315	3,094	9—17
Maize	1934	2,901	1,751	2,831	940	713	9	—	20	—	—	—
Beeswax	1945	795	456	468	712	348	586	627	*795	732	189,733	259— 4
Tea	1943	503	195	316	340	483	503	328	400	625	78,426	125—10
Sugar	1941	5,454	3,664	4,876	5,454	4,380	1,813	4,293	1,130	315	6,764	18—10
Gums (Copal and Arabic)	1944	2,567	1,311	965	1,405	904	390	2,567	1,712	1,540	91,962	59—14
Ghee	1942	1,385	896	1,213	1,125	1,385	750	400	249	327	36,254	110—17
Wheat	1945	4,511	1,426	1,450	2,475	2,166	1,887	1,960	*4,511	324	2,567	
Tobacco (unmanufactured)...	1944	1,122	441	506	649	820	1,052	1,122	935	924	93,745	101— 9
Rubber	1944	1,314	—	13	7	213	451	1,314	2,320	1,019	205,580	201—15
Vegetable oils (Coconut and Groundnut) ...	1940	2,268	1,061	2,268	1,718	1,720	1,056	983	1,801	1,009	54,755	54— 5
Papain	1944	64	4	18	15	21	39	64	101	100	186,198	1,862— 0
Onions	1944	2,007	1,058	989	1,265	1,204	1,896	2,007	1,849	1,925	46,244	24— 5
Pyrethrum	1944	396	100	244	229	305	306	396	697	668	86,538	129— 5
Fats, including Substitute for Ghee and butter	1944	1,247	—	—	1,039	273	664	1,247	650	783	38,903	49—14
Mangrove Bark ...	1942	7,291	—	4,655	6,383	7,291	3,205	5,100	4,927	5,490	60,626	11— 0
		271,409	174,121	162,595	168,446	226,071	144,898	168,242	165,092	146,909	6,385,364	3,343— 9

*New highest export tonnage.

NOTES ON THE CHIEF EXPORT CROPS

Sisal

The production of sisal in 1946 totalled 106,806 tons, which represents a decline of 5,412 tons on the previous year's record crop of 112,218 tons. The weather was partly responsible for this reduction, as under the very dry conditions experienced leaf production by the sisal plant was considerably retarded. Furthermore, several estates ran short of water and factories had to close down. The repatriation of conscript labour, and an acute shortage of cutter labour was the main factor in the diminished production, resulting in a generally very difficult year for sisal producers. A comparison with previous years is set out hereunder:—

Territorial Production

Year	Tons	Year	Tons
1941	81,640	1944	111,313
1942	99,024	1945	112,218
1943	102,369	1946	106,806

Production by Provinces

	1945 Tons		1946 Tons
Tanga—Northern Province	64,809	...	60,613
Central Line	35,497	...	36,376
Southern Province	11,912	...	9,817
Total ...	112,218	...	106,806

The arrangements for the inspection, purchase and shipment of the total output of the Territory by the Sisal Controller on behalf of the Board of Trade continued unchanged throughout 1946.

The f.o.r. price per ton of No. 1 grade sisal which was £30 during 1945 was increased with effect from 1st April, 1946, by £18 9s. per ton to £48 9s. per ton f.o.r., the lower grades being increased proportionately. Of this increased price Shs. 50/- per ton was retained by the Sisal Control on account of "Employees Welfare" this retention to be paid out to estates in due course against certificates from the Labour Commissioner that the estate concerned have made adequate provision for their employees' welfare.

Coffee

(a) *Native Coffee.*—Dry conditions at the end of 1945 and early in 1946 reduced the Bukoba coffee crop from an estimated 9,500 tons to a mere 4,540 tons, the quality of which was poor on account of the higher proportion of defective shrivelled beans. Mulching of coffee was continued in the Bukoba District, and the Native Authorities have now been given the responsibility of organizing and undertaking this work with excellent results. In the Bugufi District the emphasis in coffee propaganda at present is on changing over from the single to the multiple stem system of pruning, and another increase in the production of the Bugufi crop was recorded with an output of 152 tons.

The Kilimanjaro native coffee crop totalled 2,318 tons, and although this figure is below the average, it represents a heavy production compared with the past year's estate production, mainly because the bulk of the Chagga coffee holdings lie in the middle and upper areas of the Kilimanjaro cultivation belt,

and were thus less exposed to the dry conditions which prevailed lower down the slope. The quality, however, was poorer. The Moshi Native Coffee Board completed the first full year of operation, and from the graduated levy on the 1945/46 crop collected £51,000 for the Board's funds. These funds will be used on the Board's development programme.

In the Usambaras the native coffee crop totalled 32 tons parchment and in the Pares 30 tons parchment. The marketing of this coffee is now carried out through the Tanganyika Coffee Growers' Association.

(b) *Estate Coffee.*—In the Moshi-Arusha area the coffee crop was one of the poorest on record, particularly at the lower altitudes. The failure of the short rains and a severe drought below the onset of the long rains brought on a heavy attack of thrips and leaf miner and caused extensive die back. Production totalled only 827 tons of parchment.

In the Southern Highlands the heavy overbearing in 1945 and the adverse weather in 1946 resulted in a very reduced crop, totalling 69 tons of parchment. Similarly in the Usambaras production of estate coffee fell to a mere 43 tons.

As mentioned under the general paragraph on marketing the East African mild coffee growers conducted negotiations with the Ministry of Food for a five-year contract, and a bracket price ranging between £125-£150 per ton was accepted early in 1947.

Cotton

The Territorial crop totalled 41,025 bales, which was approximately 10,000 bales lower than the average for the previous seven years. The following table shows the production from the various Provinces in comparison with 1945 and the average for the seven year period 1939-1945 :—

Province	Average for 7 years 1939-1945	1945	1946
Lake	34,472	35,388	33,817
Eastern	11,973	4,835	6,221
Northern	2,015	304	374
Tanga	1,333	114	326
Southern	1,085	777	290
Total ...	50,878	41,418	41,028

In the Lake Province the distribution of the rains, though unfavourable to the grain crops, was satisfactory for the later maturing cotton crop, so that with a record yield of 2,000 bales from Musoma and increased planting in the Mwanza District, the Provincial total was not much below the average. There was a slight improvement in the output from the other cotton growing Provinces, due to increased plantings, though the total acreage is still very much reduced in comparison with the area under cotton in previous years. This reduction in acreage was particularly unavoidable during the past two to three years when the food position, following a succession of very poor seasons, required that the major emphasis be on food crop planting. In the Ruhji, for instance, only a fifth of the 1945 production was realized because of the utilization of all available food-land planting areas for maize and pulses. In the Southern Province the complete absence of rain during the normal cotton planting months prevented planting until late in the season, by which time most cultivators were too preoccupied with retrieving the dangerous food situation to give much attention to cotton planting.

Red bollworm was identified in the Southern Province and in view of the very serious danger to the East African cotton industry if this pest were to spread northwards, the Cotton Board took the severe step of recommending to Government that cotton production should be excluded from the Southern Province in the area south of the Rufiji and Kilwa Districts border and north of the Lindi-Tunduru road. This will result in the Kilwa ginnery ceasing to function, and a considerable decrease in the seed cotton normally available to the Mtua (Lindi) ginnery.

Groundnuts

The steady decline in the production of groundnuts reached its lowest ebb during 1946, when only 1,849 tons were marketed as compared with the record output of 22,786 tons in 1936. The Lake Province, which in pre-war years could be counted upon to produce between 8,000 to 10,000 tons of groundnuts experienced a virtual failure in 1946 with a total output of only 252 tons. In the Southern Province the position was even worse and where in 1945 there was a normal production of 1,700 tons, this year saw a complete failure of the groundnut crop. Poor harvests were also recorded in the other two groundnut producing areas of the Western and Central Provinces. Poor distribution of rain, dry conditions favouring an increase of the vectors responsible for groundnut rosette disease, and the need to consume groundnuts as food were contributory factors responsible for this exceptionally poor surplus of groundnuts.

The general world shortage of oil seeds, and the fact that in the groundnut producing areas of this Territory there are still large tracts of untappend country suggested the idea that the recent developments in mechanized agriculture might be successfully applied to the mass production of this much needed commodity and a scheme for the mechanized planting of 100,000 acres was prepared by the Director of Agriculture and suggested to the United Africa Company, whose directors considered, however, that the scheme was capable of vast expansion.

A Groundnut Commission was therefore appointed by His Majesty's Government and charged with the task of investigating the possibilities of the large scale production of groundnuts and of selecting localities for establishing the necessary projects. The Commission visited the Western, Central, Northern and Southern Provinces and after spending several weeks on the reconnaissance of the various suggested areas prepared a report which envisaged the establishment within six years of eighty 30,000 acre units, estimated to produce in a normal year an output of approximately 400,000 tons of groundnuts. The areas selected were in the Mpwapwa, Tabora and Lindi-Liwale Districts, the last mentioned to be the major area with a preliminary aim of fifty-five units. The Groundnut Scheme was finally approved by His Majesty's Government in December, 1946, and the Mpwapwa area was selected for the purpose of planting an initial five units in 1947. Work on building a camp for the advance party was already started before the close of the year.

Sesame

The bulk of the Territory's sesame comes from the Southern Province and the export during 1946 of 2,976 tons was not much below the average. It was estimated, however, that approximately 1,000 tons was a carry over from the previous year. Elsewhere in the Territory production only totalled 272 tons.

Grains

A measure of the exceptionally poor season is the amount of food classed as grain, flour and pulses which had to be imported into Tanganyika during 1946. During the year under review 46,869 tons including 7,000 tons of maize from the Argentine were imported which is more than twice the average of such imports prior to 1945.

(a) *Paddy.*—A dry season such as was experienced in 1946 was particularly unfavourable for paddy, and the only area which produced a reasonable crop was the Lakeshore area in the Rungwe District where 2,801 tons of paddy was marketed. The Lake Province and the Eastern Province, which normally are the main producing provinces, could only market 1,341 and 427 tons respectively. It should be mentioned, however, that although the Territorial output totalled 5,304 tons, this figure only represents the quantity of paddy which reached the regular markets. "Black market" prices for this commodity attained a phenomenally high value, and in parts of the Eastern Province a bag of rice would fetch Shs. 400/-, while elsewhere Shs. 100/- to 150/- was a common price. At such prices a considerable amount of rice naturally never reached the open markets, and it is surprising that as much as 5,304 tons of paddy actually was purchased at such markets.

(b) *Wheat.*—In spite of the poor weather, which in some parts caused a complete crop failure, the Northern Province Wheat production was only some thirteen per cent lower than the previous two years high output, as shown in the accompanying table :—

Year	Native and Non-Native Farmers Bags	Northern Province Wheat Scheme Bags	Total Bags
1942	58,486	—	58,486
1943	62,193	—	62,193
1944	96,030	45,000	141,030
1945	65,374	75,208	140,582
1946	63,168	58,854	122,022

The Ardai section of the Northern Province Wheat Scheme suffered the greatest damage from the drought, and of some 15,000 acres planted only 7,340 were worth harvesting. This was balanced fortunately by excellent yields from the Mbulu-Mbulu section where over a total of 3,712 acres an average of 9·88 bags per acre was recorded.

The other wheat-growing areas of the Territory also fared badly, and in Songea the sudden cessation of the rains in May did not allow later plantings to mature, with the result that the crop was only 4,682 bags. In the Southern Highlands Province interest in wheat showed a decline among the non-native planters of Iringa who marketed only 1,108 bags; but this was somewhat offset by the increased planting of wheat by natives in Mbeya and Njombe.

(c) *Maize.*—As with most of the other crops, 1946 was a very poor maize year, and the amount marketed totalled 126,500 bags as compared with 225,000 bags in 1945. The bulk of this came from the Southern Highlands and the Northern Province with 40,275 and 37,300 bags respectively, the latter being the yield from one of the poorest maize crops on record.

Government's policy of offering a planting grant of Shs. 15/- an acre for maize planted in blocks exceeding twenty-five acres together with a guaranteed minimum return and a guaranteed price of Shs. 13/50 per bag as well as the continuation of crop and machinery loans stimulated a considerable increase

in the acreage of maize planted by non-natives. In effect, more than 44,000 acres of maize were planted in response to this policy of encouraging production and the various District Production Committees approved the paying out of planting grants on the following acreages:—

Province	Acreage qualifying for planting grants Acres
Northern	15,506
Southern Highlands	4,091
Eastern	15,764
Tanga	8,999
Central	400
Total ...	44,760

For the 1947 season the maize planting grants will be raised from Shs. 15/- to Shs. 32/- per acre, with a guaranteed price of Shs. 13/50 per bag of 200 lbs. Alternatively, maize growers can choose not to receive the planting grant and sell their maize at Shs. 17/50 per bag plus a bonus of Shs. 3/50 per bag where deliveries of not less than thirty bags are made at one time.

(d) *Millets and Sorghums.*—The principal area supplying a surplus of this type of grain is the Southern Province, which exports an average of 44,000 bags of sorghums in a normal year. The worst season on record, however, reduced exports to nil, and any small amounts which may have been marketed were used to meet local food shortages in the Southern Province. The production of the Lake and Western Provinces was poor and in the Central Province this staple crop was almost a complete failure in many areas which resulted in famines lasting five to seven months.

Copra

The production of copra in 1946 was approximately 1,000 tons less than in the previous year, the total for the three coastal provinces amounting to 9,058 tons as compared with 10,000 tons in 1945. Dry conditions affected the production of nuts and the greater demand for coconuts required to make good the general shortage of food reduced the proportion of nuts normally utilized for the manufacture of copra.

The quality of the copra produced still leaves much to be desired. Rules had been drafted under the new Copra Ordinance enacted in 1945 whereby the quality of the copra could be raised and certain standards enforced. These rules have not yet been promulgated, nor has the necessary staff to enforce these rules been found. As a result quality in the Tanga Province, where a voluntary system of grading had been adopted in 1944, has fallen off for lack of the necessary sanction to maintain higher standards, so that where in 1945 Grades I and II represented 52 per cent of the total amount of copra purchased, in 1946 these two grades only made up 31·5 per cent of the total.

The sanitation of coconut groves is being pressed wherever staff is available, and steady improvement is being obtained in certain areas.

Tea

The Territorial output of made tea reached a record figure of 1,480,919 lbs. This steady increase is the result of the new areas coming into pluck in the Southern Highlands Province, which additional acreage has masked the effect

of insufficient rain and poor distribution of the rainfall in the Usambaras and in the Mufindi area. A further 130 acres were also planted on a new tea estate in the Eastern Usambaras bringing the total acreage up to 296 acres in that area.

Sugar

The only estate producing white sugar is situated in the Northern Province and the output during 1946 was 7,250 tons with an additional 400 tons of coarser sugars. This was an improvement on the previous years production when only 6,854 and 450 tons of white and coarse sugar respectively were produced.

Elsewhere in the Territory a number of small scale presses produced "jaggery" or unrefined brown sugar under primitive conditions. The amount thus produced was estimated to be in the region of 1,100-1,200 tons, and this total should increase in the next few years as interest is being shown in extending the planting of sugar cane, both in the Eastern and in the Tanga Province. In the latter Province a large area of cane is reported to have been planted along the lower reaches of the Pangani river, and sugar machinery for the manufacture of jaggery has already been erected and production is expected to start early in 1947.

Tobacco

(a) *Fire-cured.*—A fair crop of fire-cured tobacco was produced in the Songea District in spite of the poor distribution of the rainfall, and the quality was up to average. Three hundred and fifty-two tons were purchased from the growers and the leaf was handled in the Ngoni-Matengo Co-operative Marketing Union's factory at Songea. The amount available for sale was 266 tons, which represents a high factory loss of 25½ per cent. Comparison with the output, of baled leaf and strips for sale during previous years shows an improvement again over 1945 and 1944 :—

	lbs.		lbs.
1940	963,200	1944 ...	385,280
1941	790,920	1945 ...	351,680
1942	694,400	1946 ...	585,860
1943	1,046,080		

During the year the Songea District Native Tobacco Board was reconstituted under the Chairmanship of the Director of Agriculture.

In Biharamulo only 48 tons of fire-cured tobacco were produced, a poor crop due to a reduction in the number of growers, to the poor rains and to some heavy hail damage, as well as to the severe incidence of red rust.

(b) *Flue-cured tobacco.*—Adverse weather in the Southern Highlands reduced the output of flue-cured tobacco and the crop was approximately half a million pounds smaller than the record 1945 crop. Production over the past seven years was as follows :—

	lbs.		lbs.
1940	66,100	1944 ...	1,523,669
1941	325,481	1945 ...	1,537,903
1942	814,299	1946 ...	1,027,164
1943	1,132,731		

In addition to the adverse weather, the falling off in the local demand for tobacco at the beginning of 1946 caused many planters to abandon tobacco growing so that the acreage planted was considerably reduced. The grading

sheds handled 1,386,501 lbs. of tobacco and scraps during the year, and the years working showed a profit of Shs. 16,500/-. The price paid for tobacco varied between Shs. 2/20 to Shs. 2/70 per lb. for No. 1 grade, and between 75 cents and Shs. 1/20 for No. 7 grade.

(c) *Native roll tobacco.*—In various parts of the country there is a certain amount of unorganized tobacco growing which is sold as roll tobacco. Production during the year was stimulated by the high prices being received for this commodity, Shs. 1/50 to Shs. 2/- per kilogram, and more than 450 tons were sold in the Southern, Tanga and Eastern Provinces.

Pyrethrum

There are two areas producing pyrethrum, the Southern Highlands Province and the Northern Province. Production from the former was better than in the previous year, but drought, damage due to thrips and a labour shortage reduced the output from the Northern Province.

	1945 lbs.	1946 lbs.
Southern Highlands Province	988,494	1,066,560
Northern Province	801,920	689,920
Total ...	1,790,414	1,756,480

Papain

The planting of papaws had to be restricted in the first half of the year in view of the serious deterioration in the food position and the need to restrict the use of labour on crops other than food crops and sisal. New plantings could only be carried out against a permit, and new acreages were limited to thirty acres per annum. Later, when the food crop prospects were found to be even less promising, all new plantings were stopped for a time. Towards the end of the year, however, this complete restriction was relaxed and permits were freely issued for papaw planting on the condition that four times the acreage under papaws would be planted and maintained under food crops.

The price of papain steadily rose throughout the year, starting at Shs. 9/- per lb. and reaching Shs. 24/- per lb. in December with the market still strong and rising. Permits to plant papaws were therefore in great demand and included applications from many districts in the Territory outside the principal papain producing area (Arusha and Moshi). The total acreage for which permits were issued during 1946 was 1,377 acres so that production in 1947 should be even greater than the record output of 96 tons valued at £178,320 achieved during 1946.

Seed Beans

This small but specialized industry, which is located in the Northern Province, continues to make steady progress and in spite of the very poor season a further increase in output was recorded with 543 tons (valued at £22,588) exported as compared with 490 tons in 1945.

Legislation was drafted during the year for the purpose of organizing and controlling the cultivation, processing and export of seeds.

Onions

The principal onion producing area is the Northern Province, where over 2,000 tons of onions have been produced in the past. During 1946 the very

dry conditions affected the level of the water in rivers and furrows and thus interfered with the irrigation of nurseries and of the onion fields at the time of transplanting. The dry weather also encouraged a very severe attack of onion thrips and production from the Northern Province declined to 1,683 tons, which, with the 224 tons produced from the small scale plantings in other provinces, gave a Territorial total of 1,907 tons.

Plantation Crops (other than above)

Cinchona.—The production of cinchona bark has risen over the past three years from 60 tons in 1944, and 71 tons in 1945 to 92 tons in 1946. The acreage has also been extended, both in the Eastern and the Western Usambaras and the total acreage under cinchona is now estimated to be 1,200 acres.

Rubber.—The production of rubber by the Managing Agents came to an end in August, 1946, when the organization of rubber production was wound up. Seven hundred and sixty-two tons were produced during the eight months.

Kapok.—The yield of kapok in 1946 was exceptionally good, especially in the Eastern Province, which produced 220 tons. The production for the Territory totalled 372 tons.

Derris.—The only area producing derris root is in or around the Usambaras, and there has been a steady rise in output over the past few years, with 16 tons in 1944, 39 tons in 1945 and 44 tons in 1946. About 70 acres of new plantings were made during the year.

Tung oil.—There are about 210 acres of tung oil trees in the Usambaras and in 1946 these yielded a crop totalling 16 tons. This was bulked and milled in Tanga, giving an output of 9,000 lbs. of oil which was shipped to the Board of Trade at £230 per ton f.o.b. Tanga.

Cocoa.—Two tons of cocoa were produced on the Sigi Segoma Estate in the Tanga Province.

Essential oils.—The principal essential oils produced are bitter orange oil, of which 6,944 lbs. were produced on one estate in the Tanga Province; lemon grass oil, 20,870 lbs. from the Morogoro District; senolene (*Ocimum suave*); *Ocimum Basilicum* and *Geranium graveolens* about 500 lbs. of each, produced in the Northern Province; and smaller quantities of many other types also produced in the Northern Province.

Palm oil.—Palm oil is produced on a plantation basis on only one estate, situated in the Eastern Usambaras, and the yield in 1946 was 15 tons of palm oil and 25 tons of kernels. In the Kigoma District the Luitche valley carries approximately 20,000 palms, the estimated production of which is 50 tons of pericarp oil and 100 tons of kernels. In the past these kernels were thrown away, but a start has been made to revive the marketing of kernels and in 1946 17 tons were exported to the coast.

Cashew nuts.—Exports in 1946 totalled 2,118 tons, of which 1,900 tons came from the Southern Province. This total compared favourably with the 1945 export of 2,669 which included considerable accumulations from previous years when shipping difficulties restricted the export of this crop.

Root Crops

Cassava.—The value of cassava as an insurance against poor seasons and food shortages has been amply proved recently in the areas where this crop

grows satisfactorily. Great inroads had of necessity to be made on the reserves of this crop during the past two years, and compulsory planting had to be enforced again in many areas in order to replenish these reserves.

Although the bulk of the cassava reserves during the year was consumed by the individual growers, there was still a considerable surplus for sale on the local produce markets in the case of the Western Province and of the Southern Province, which marketed 2,210 tons and 1,870 tons of dried cassava respectively. A further 310 tons were marketed in the Southern Highlands and Eastern Provinces.

Sweet potatoes.—Where cassava grows well sweet potatoes are of secondary importance, but people are encouraged to plant these in valleys and seepage areas as an additional food reserve. In other areas, such as in the Central Province where cassava has made little headway, sweet potatoes form the principal root crop. Unfortunately a succession of very dry years has greatly reduced the reserves of this crop, and by the end of 1946 planting material for establishing the required minimum acreage was in very short supply. A shortage of planting material was also reported from the Tanga and Eastern Provinces.

European potatoes.—One thousand one hundred and eighty-three tons of European potatoes were sold through the produce markets, the principal areas of production being the Southern Highlands 344 tons, Bukoba 370 tons, the Eastern Province 220 tons and the Northern Province 181 tons. The dry conditions actually favoured potato growth in that the incidence of blight was appreciably reduced.

The Western Usambaras, which formerly produced a surplus of close on 1,000 tons a year, have still not recovered from the catastrophic blight which wiped out the long rains crop of 1943, and during the year only 12 tons were railed from the district. The work on testing various blight resistant varieties has, however, given some very promising results.

Leguminous Crops

The surplus of pulses and allied leguminous crops available for sale on local markets was considerably reduced during the past unfavourable season. The most satisfactory was the chick pea crop in the Lake Province, which yielded 700 tons. Soya beans, which are grown in the Karagwe area of the Bukoba District, yielded 400 tons. Mixed beans, including a fair crop of Canadian Wonder Bean from the Northern Province, totalled 845 tons. Pulses, such as cowpeas, green gram and pigeon pea, totalled 177 tons. White Haricot beans yielded 32 tons in the Northern Province and 31 tons in the Kasulu District of the Western Province.

Vegetables and Fruit

The principal areas producing vegetables are the Usambaras and Uluguru mountains, and the Kilosa and Iringa Districts. Production was satisfactory with a total of 1,405 tons, of which 773 came from the Eastern Province, 200 tons from the Southern Highlands and 390 from the Tanga Province.

Citrus production in the Muheza area was affected in regard to the main crop, which suffered from the prolonged dry season and produced only 264 tons for sale. The fly crop, on the other hand, was exceptionally heavy and up to the end of the year 584 tons were purchased, with an estimated balance

of 250 tons still to be purchased in January. In addition to the Muheza crop 221 tons of citrus were produced in the Bukoba District where the supply was in excess of the demand.

Bananas form an important staple food in several districts of the Territory, but due to the very unfavourable season around Kilimanjaro there was an acute shortage of this crop, and for three months the use of bananas for brewing beer for sale had to be prohibited.

Wild Products

Beeswax.—The collection of beeswax was stimulated by the widespread failure of food and cash crops, and production rose to 601 tons, which figure represents the total amount of beeswax coming on to the various produce markets. That there is an additional amount being marketed through obscure channels is evident from a comparison of the market returns and the export figures over the past five years, as shown in the accompanying table :—

Year	Production Tons	Export Tons	Value £
1942	410 ...	348 ...	57,640
1943	980 ...	586 ...	102,603
1944	540 ...	627 ...	110,276
1945	255 ...	795 ...	132,297
1946	601 ...	732 ...	189,733

Honey.—The amount of honey collected, 3,320 cwts., compared favourably with the amounts exported during the previous two years, though the actual exports for 1946 as shown below were considerably lower :—

Year	Export in cwts.	Value in £
1942	2,357	3,464
1943	17,355	31,848
1944	3,462	6,430
1945	3,045	5,690
1946	1,701	4,078

Gums (Copal and Arabic).—The export of gums was slightly lower than in 1944 and 1945, but still considerably higher than over the previous four years as indicated below :—

Year	Exports Tons	Value £
1940	965	25,398
1941	1,405	46,754
1942	904	40,107
1943	390	21,916
1944	2,567	114,657
1945	1,712	107,274
1946	1,540	91,962

Castor Seed.—With a rise in the price of castor seed from 14 cents a kilogram to 30 cents a kilogram, the collectors of this commodity brought 421 tons to the market, which shows considerable increase on previous totals.

Wild Rubber.—A total of 46 tons of *Landolphia* rubber was marketed in the Southern Province. This shows a considerable reduction on the 118 tons marketed in 1945.

Colombo Root (*Jateorhiza palmata*).—The dry climate appears to have reduced the amount of Colombo Root, and only 73 tons was exported compared with the 1945 figure of 346 tons.

Starch.—One hundred tons of starch from the wild plant *Tacca pinatafida* was produced during the year.

SECTION II.—DETAILS OF ASSISTANCE AND PROGRESS

The organization of the department provides for the Agricultural staff in each of the eight Provinces to be under the charge of a Senior Agricultural Officer, and a review of the agriculture and the work carried out in each Province is given below. The year has been one of serious staff shortages with a deficiency of nine in the establishment of twenty-nine Agricultural Officers due to secondment, special duties and vacancies, and with a shortage of ten in the establishment of thirty-six Agricultural Assistants and Senior Agricultural Assistants. The actual details of the European staff is given in Appendix No. 1.

Besides fifteen Asiatic clerks the department employed the following African staff:—

4	African Agricultural Assistants.
97	Recorders.
15	Mechanics.
395	African Instructors (Local Civil Service).
508	African Instructors (War Production Staff).
25	Laboratory Assistants.
44	Overseers.
20	Motor Drivers.
36	Clerks (Local Civil Service).
40	Messengers.
23	Instructors, Local Civil Service (Cotton Industry).

In addition to the above, there were also 358 Native Authority Instructors, who, though paid out of Native Treasury funds, performed duties similar to those of the Department's Instructor staff, and were under the general supervision of the department's officers.

The training of the African staff is considered to be one of the most important of the department's functions, as it is only through well trained and qualified Agricultural Instructors that proper contact can be maintained with the peasant cultivators. The Agricultural Training School at Ukiriguru is as yet the only school where serving instructors, probationers and new candidates receive such training and during the year one hundred and twelve students were in residence, which is an increase on the seventy students attending the school in 1945. Accommodation was only barely sufficient, but plans for the building of a new school were well advanced, and it is anticipated that construction will start in 1947.

A summary of the general agriculture and work carried out in each of the Provinces follows:—

Northern Province

Besides the Senior Agricultural Officer there were four Agricultural Officers, four Crop Supervisors and one Temporary Agricultural Assistant posted to districts in the Province. African staff comprised a total of forty-one Local Civil Service Agricultural Instructors and fifty War Production Staff Instructors.

The short rains of 1945/46 were not only late in commencing but were a complete failure due to the drought which prevailed throughout January, February and March. The long rains were also late in starting and then

came to an abrupt end in the latter half of May. As a result of this outstandingly poor season crop yields were very light and there were many local food shortages which, in Mbulu, assumed the proportion of a famine necessitating the importation of some 7,000 bags of food for famine relief.

The coffee production in the Moshi-Arusha area was one of the poorest on record, brought about by the above-mentioned climatic conditions which in turn encouraged extra heavy attacks of thrips, leaf miner and die-back. On some of the low altitude estates there was practically no crop at all. The actual exports for the past three years was as follows, expressed as tons of parchment :—

	1944/45	1945/46	1946/47
Arusha-Mbulu:			
Native	198	94	161
Non-Native	1,531	1,441	678
Moshi:			
Native	3,886	3,102	2,318
Non-Native	1,027	1,551	149
Total	6,642	6,188	3,306

The Moshi Native Coffee Board collected £34,898 from the graduated levy imposed on the 1945/46 crop. The long-term contract with the Ministry of Food will assure further similar amounts for the next five years and such funds will be used to complete the Board's development programme. This includes a £12,000 water pipe scheme for improving the preparation of coffee and general agriculture in the Rombo area; the sharing of the costs of expanding the capacity of the Moshi Curing Works; establishing propagating centres as part of the plan to replace existing Chagga coffee by high yielding trees together with various building plans to house the Board's propagating and instructor staff.

Climatic conditions over the greater part of the Province were unfavourable for wheat and the crop in general was poor. Drought caused a fall-off in yields and where dry conditions were extreme a complete crop failure was experienced. Unseasonable rains in September caught late harvested wheat, particularly that grown by natives, and caused considerable damage to the standing crop. The actual production for the 1946 season in comparison with the previous two seasons is given below :—

	1944 tons	1945 tons	1946 tons
Native:			
Arusha	642	387	112
Moshi	49	9	20
Mbulu	136	343	—
Non-Native:			
Arusha-Mbulu	3,216	2,067	2,277
Moshi	658	482	477
Wheat Scheme:			
Ardai Plains	4,148	3,928	589
Mbulumbulu		1,601	3,333
Ngare Nairobi		1,308	1,428
Total for Province	8,849	10,125	8,236

The Northern Province Wheat Scheme suffered mainly in the Ardai Plains where, owing to lack of rain, only 7,340 acres out of the 15,039 acres sown were worth harvesting. The yield from these plantings on the Ardai Plains only averaged 0·88 bags per acre, but this was offset by yields of 9·88 bags per acre over 3,712 acres in Mbulumbulu and 4·51 at Ngare Nairobi.

The maize crop in the Northern Province was the poorest during recent years—again due to the delayed onset and sudden termination of the main rains. Approximate figures of sales of surplus maize to the Produce Controller were as follows :—

	1945 tons	1946 tons
Moshi:		
Non-Native	5,442	2,549
Native	1,933	345
Arusha:		
Non-Native	1,484	292
Native	414	206
Total ...	9,273	3,392

The Cotton crop in the Northern Province was slightly higher than during the previous two years, partly due to increased plantings in the Moshi District which offset to some extent the effects of the drought and lack of irrigation water. The actual purchases of seed cotton in the three districts were as follows :—

District	1944/45 Tons	1945/46 Tons	1946/47 Tons		Total Tons
			AR	BR	
Moshi ...	95	107	126·5	27·1	153·6
Arusha ...	33	13	6·5	2·3	8·8
Mbulu ...	—	32	13·9	10·7	24·6
Total ...	128	152	146·9	40·1	187·0

Plantation crops included sisal, sugar, papain, pyrethrum, seed beans and mixed beans. The table overleaf shows that, in spite of the very poor season, all the items except pyrethrum show a greater production in 1946 than in the previous year and in many cases than in 1944. This was partly due to increased plantings, which in the case of papaws was on a fairly marked scale, stimulated by the spectacular rise in the price for papain.

Production of Plantation Crops, Northern Province

Crop	1944 Tons	1945 Tons	1946 Tons
Sisal	4,860	5,524	5,886
Sugar	7,700	7,304	7,650
Papain	67	49	96
Pyrethrum ...	—	358	308
Seed Beans ...	—	490	543
Beans (Haricot and Canadian Wonder)	—	—	395

Onions suffered as a result of the drought and the shortage of water in the rivers and furrows which interfered with the irrigation of nurseries and the subsequent transplanting. The dry conditions also favoured onion thrips

and the crop had to endure a very severe attack of the pest. The export over the past three years is shown below :—

	1944 Tons	1945 Tons	1946 Tons
Moshi	1,156	875	740
Arusha and Mbulu	764	1,325	943
Total ...	1,920	2,200	1,683

The production of onion seed at the three onion nurseries established in the Mbulu District was exceptionally poor, due again to the dry conditions, insufficient irrigation water and very severe thrips infestation. The total yield of seed amounted to only 420 lbs.

Soil conservation work continued to make good progress on native land, particularly in the Moshi District where six soil conservation teams, each under a Senior Agricultural Instructor and possessing levels for demarcating contours, move seasonally from the lower plains up to the middle and upper areas of cultivation on the mountain slopes. In the Mbulu District work continued with laying out contour lines for trenching and protective drains.

Production Committees continued to function for the fifth year since their inception, the Arusha Committee meeting on seventeen and the Moshi Committee on thirteen occasions.

Tanga Province

The staff during the year comprised the Senior Agricultural Officer stationed at Lushoto; an Agricultural Officer at Tanga and a second Agricultural Officer at Malindi (Lushoto division) in charge of the Mlalo Rehabilitation Scheme; a Senior Agricultural Assistant at Handeni; an Agricultural Assistant on building construction at Same and another Agricultural Assistant carrying out an irrigation survey in the Luengera Valley. A temporary Crop Supervisor was employed on copra improvement and a temporary Cotton Supervisor was stationed in the Pares. The African staff consisted of four Grade III African Instructors, sixty-five permanent Instructors, sixty-nine temporary and probationary Instructors and twelve Native Authority Instructors.

For the second year running the rainfall was generally unfavourable. The 1945/46 short rains were late and of short duration and only in rare instances were they sufficient to produce appreciable crops. The long rains were very poorly distributed and an early start in March was followed by a protracted drought lasting until late April. The duration of these rains was very short so that with a poor distribution and a total precipitation amounting to only two-thirds of the average the crops were most disappointing. A change for the better occurred, however, later in the year when the "Mchoo" or "in-between-rains" were adequate and well distributed, giving reasonable returns on maize plantings and proving very useful for rootcrops.

Food shortages were experienced during the year in a small area in North Tanga, a few isolated villages in the Handeni and the Pare districts and in the mountains north of Lushoto, which latter area has now been enduring semi-famine conditions for four successive seasons. Imports of food into the Province in 1946 totalled 15,500 tons compared with 16,700 tons in 1945 and 10,000 in 1944. The bulk of this was consumed on sisal estates and by rubber production labour.

The native-grown maize crop fared very poorly except on the southern slopes of the Western Usambaras where the early plantings survived with the help of occasional showers until the main rains arrived. Non-native production was estimated to have yielded approximately 1,000 tons, but of the native production only 90 tons were sold through recognized channels.

The production of paddy was the lowest on record, totalling 47 tons as compared with a yield of 2,700 tons in 1942. This figure of 47 tons only represents the paddy reaching the produce markets, whereas the actual yield was estimated to have been approximately 300 tons. With the "black market" price being anywhere up to one shilling a kilogramme compared with the controlled price of seventeen cents, it is not surprising that the greater proportion did not reach the recognized markets. The actual sales over the past three years were as follows:—

	1944 Tons	1945 Tons	1946 Tons
Korogwe	135	159	23
Pares	745	606	24
	880	765	47

Another locally-important crop which has seriously declined in the past few years is the potato crop in the Western Usambaras, a crop which was being exported to the extent of nearly 1,000 tons a year, as well as serving as a staple article of diet to many thousands living in the higher parts of the mountains. This decline dates from 1943 when Irish blight (*Phytophthora infestans*) wiped out the long rains crop. Since then exports have never exceeded 20 tons (1946—12 tons) while at the same time a continuous state of food shortage has persisted in those areas which normally depend on potatoes as part of the staple diet. Work on finding strains immune to blight and suitable for cultivation in the Usambaras has been progressing since early 1943 and some promising varieties have already been noted amongst the nine varieties imported for this purpose. These varieties originated from the Scottish Society for Research in Plant Breeding and three of these have shown themselves to be high yielders and reasonably free from other diseases. The three varieties are 914a, 914b and 833b, one ton of seed of 914a being expected from the 1946 short rains crop.

Sisal production was affected by the dry conditions which not only reduced the output of leaf but also necessitated the closing down of the factories on those estates where the water supply had dried up. Labour shortage was another factor particularly in the case of estates in the Usambara area affecting production and the year's output fell to 34,727 tons, which compares unfavourably with the previous five years production as shown below:—

	Tons
1942 ...	53,762
1943 ...	55,532
1944	39,193
1945 ...	59,285
1946	34,727

Other plantation crops in the Tanga Province included cinchona, which yielded 62 tons of bark (compared with 71 and 47 tons in the two previous years). The acreage under cinchona was extended and the present acreage is estimated to be 1,200 acres. Tanga's production is also on the increase in the Tanga Province following the interest roused by the rapid rise in the price for copra. The acreage is now estimated to be between 500 to 600 acres.

Tea output from the factory situated in the Western Usambaras showed a further drop to 339,192 lbs. mainly due to unsatisfactory rains but also due to labour difficulties. The new plantings of tea in the Eastern Usambaras were extended by a further 130 acres, bringing the total up to 296 acres of young tea gardens. As usual only a very small quantity of cocoa, totalling two tons in 1946 was produced in the Eastern Usambara foothills. Derris production was again increased, 44 tons being exported in 1946 as compared to 39 and 16 tons in the two previous years and about 70 acres of new plantings were established. Rubber production up to August, when manufacture closed down, amounted to 700 tons bringing the total output during the three years of operation to 4,000 tons for the Province. Kapok exports totalled 152 tons.

The number of cotton growers increased in 1946 by 2,000 to a total of 7,000. This figure is still only one-third of the pre-war numbers, but it showed a renewed interest in the crop. Unfortunately a large number of these growers hardly obtained any crop, as most of the cotton had to be replanted at a date much too late for good results. The actual production and comparison with previous years was, in tons of seed cotton, as follows :—

District	1940	1944	1945	1946		Total
				AR	BR	
Pare	1,323	335	52	67·8	28·5	96·3
Handeni ...	1,105	35	24	63·8	17·5	81·3
Korogwe ...	305	50	14	18·8	5·5	24·3
Total ...	2,733	420	90	150·4	51·5	201·9

Coffee in the Usambaras and the Pares is now marketed direct through the Tanganyika Coffee Growers' Association. The exports over the past three years for the two districts, in tons of parchment, were :—

	1944	1945	1946
Usambaras	133	150	75
Pares	11	24	23
Total ...	144	174	98

Of the oil-producing crops, copra is the most important and 3,786 tons were sold during the year, which compared favourably with the two previous years' production. Quality, however, had deteriorated and where in 1945 Grades I and II represented 52 per cent of the total, in 1946 these two grades only made up 31·5 per cent of the total. Little can be done to improve this situation until the draft Copra Rules submitted to Government in 1945 are promulgated and this in turn must await the posting of the necessary European staff to enforce the rules. Palm oil production dropped from 27 tons in 1945 to 15 tons in 1946; 9,000 lbs. of tung oil was produced locally from 16 tons of nuts produced on about 210 acres planted in the Eastern Usambaras.

Citrus, an important cash crop in the Muheza area, suffered as a result of the drought and only 264 tons were marketed from the main crop. At the end of 1946 the "fly crop" was unusually heavy and fruit was arriving in great quantities, 584 tons up to 31st December, with an estimated 250 tons still to come. The shrinkage of the Kenya market, owing to the cessation of War Supplies Board orders and the repatriation of refugees and prisoners of war, presented difficulties in the disposal of the fly crop and it is anticipated that these difficulties will arise next year. The possibilities of using a proportion of the surplus citrus crop for the extraction of fruit juice is being investigated

and the establishment of such an extraction plant could not only make good the lost markets mentioned above, but could also provide the means for expanding the Muheza citrus industry into an export trade.

Vegetable production in the Usambaras declined to 390 tons which was below the 1945 figure of 625 tons or the record output of 1,100 tons in 1943, when the War Supplies Board provided an extensive market for large quantities of vegetables.

Native air-cured tobacco is grown in the higher altitudes of the Western Usambaras and Western Handeni. As a result of the high prices now being offered, averaging Sh. 1 - and in some cases as high as Shs. 2 - per kilogram, the production has increased and 137 tons were railed from the Usambaras alone.

Anti-erosion measures, which at present consist mainly of the establishment of live contour hedges in cultivated land, have taken up a considerable proportion of the African Instructors time in the Usambaras and it is estimated upwards of 500 miles of contour hedges have been demarcated with road tracers during the past year. A good deal of this hedging is rendered ineffective by cattle trampling down large sections of it when driven into arable fields after harvest. This damage can only be countered by prohibiting grazing on arable land, a measure which would require the provision of additional grazing ground or stall feeding. The considerable expansion in the human and stock population over the past ten to fifteen years has greatly increased the pressure on the land, so that fallows are becoming shorter or even non-existent, and to find sufficient grazing for stock has become a major problem. In order to tackle this problem the "Mlalo Basin" has been chosen as typical of the overcrowded and eroded areas of the Western Usambara mountains and within this area an investigation centre has been set up. This centre will work out, and subsequently demonstrate, means of regenerating soil and cover on denuded slopes, methods for conserving fertility and moisture and how to farm to the best advantage land still in effective occupation. This investigation scheme will cost approximately £15,000 spread over a period of five years and an Agricultural Officer was posted to Malindi, the site of the investigation centre, in June, 1946.

During the year funds were provided by the Water Development Department for a preliminary survey of a part of the Luengera Valley, in pursuance of a scheme suggested by this Department for a 25 cusec twelve-mile water furrow. This furrow is intended to regularize the level of water in the rice fields, to provide domestic water in areas at present not being used and which could relieve overcrowding in the surrounding hills and to make available facilities for one or two irrigations of maize and cotton during the normal growing season—a facility which in many years could turn a prospective maize failure into a good harvest. The survey was completed and the Director of Water Development inspected the area and suggested a further survey. The prospective furrow is estimated to be capable of serving 4,000 acres of land, or if lengthened by a further two miles, a total of 6,000 acres. This would represent land for an additional four hundred families.

Central Province

The staff in the Central Province consisted of a Senior Agricultural Officer and one Agricultural Officer stationed at Dodoma; an Agricultural Officer at Singida; an Agricultural Assistant subsequently replaced by a Field Officer

at Manyoni; an Agricultural Assistant at Kondoa. The African staff consisted of three Recorders, twenty-two Local Civil Service Instructors, sixty-eight War Production Staff Instructors and seventy-four Native Authority Instructors.

Rainfall during the 1946 season was extremely poor in most parts of the Province, and drought actually proved disastrous within a 50-75 mile wide belt starting in Usandawe and running south-west along the Saranda scarp. Only in Mpwapwa, parts of Singida and in the north of Kondoa-Irangi were conditions at all favourable.

Consequent on the very poor rainfall, a total of only 13-14 inches in the crop failure area mentioned above, famine conditions prevailed in the central part of the Province, including Usandawe, the Bahi depression, and along the Saranda scarp. Another confined famine was experienced in the Wilwana chiefdom of Singida, and in many other areas food supplies were only barely adequate. At the same time and in spite of the generally very unfavourable season, there were areas in which food crops made a remarkable recovery, so that the yield of grain was sufficient to allow of a surplus being moved into the famine areas of the Province and into the adjoining food shortage regions of the Lake and Northern Provinces. The provincial famine itself was estimated to require 8,850 tons of famine relief, of which total 2,760 tons was obtained from within the Province, Singida being the principal contributor. This amount of grain was obtained by drawing on the tribal reserves, which had been built up by collecting a levy of half a bag from each taxpayer. Where crops had been reasonably good, as in the northern part of Singida and in parts of Mpwapwa, the levy was increased to allow for a transfer of a surplus to the famine areas, the surplus being paid for at the current market rates.

The policy of building up tribal food reserves as an insurance against the all too frequent famines was started in 1944 following the disastrous famine of 1943. Every taxpayer had to contribute his half bag of grain, which at first was stored in primitive wicker-work grain bins situated at the various Native Authority headquarters. These bins are rapidly being replaced by fifty-ton burnt-brick silos, of which thirty-seven were completed in 1944 and 1945, and a further fifty-four completed in 1946, providing a total storage capacity of 4,680 tons. It was extremely difficult in the famine and near-famine areas to fill the grain silos, but as much pressure as possible was applied to obtain at least a proportion of the levy from each taxpayer, thus counteracting to a certain extent the reliance on Government famine relief which had recently become all too prevalent.

Root crops as a famine reserve were in very short supply. Up to the present almost the whole of the Province has depended on sweet potatoes for this purpose and a succession of poor seasons greatly reduced the amount of planting material carried over, with the result that not only was the acreage in 1946 inadequate, but a further year of insufficient and badly distributed rains produced only a very poor crop.

Groundnuts and gum are the principal cash crops in the Central Province, though grain crops in years of good harvest provide an additional commodity for sale. The groundnut crop was the lowest for many years, totalling 721 tons as compared with 1,260 tons in 1945 and 3,311 tons in 1942. Gum collection should have been on the increase in a year of food shortages but only 182 tons passed through the markets, the lowest figure for the past seven years

excepting 1943. Other cash crops included beeswax 30 tons, and honey 57 tons; castor seed 79 tons; onions 174 tons; potatoes 56 tons; "jaggery" 80 tons, mostly from Singida.

Soil conservation work, mainly broad-base terraces, when carried out on a communal basis, was found to be too slow if an early protection of all arable land in the Province was to be obtained. A change over was therefore instituted in 1945 making each individual cultivator responsible for the construction and maintenance of a suitable number of contour banks on his cultivated land. The contour lines were demarcated by Departmental staff, and for this purpose the number of striding levels in use was greatly increased in 1946 and one hundred and thirty-four such levels were in operation for three months of the dry season with almost the whole of the Instructor staff concentrated on this work. Very good progress in the number of contour banks constructed was reported, and it was estimated that over forty thousand individual fields were thus protected. The quality of the work on the other hand was not all that could have been desired, and constant pressure had to be applied to obtain the minimum size of bank required. In addition to the general contour banking campaign attention was also given to gulley stopping, to enforcing the rule prohibiting cultivation near gulleys and incipient gulleys, and to encouraging tie-ridging in parts of the Mpwapwa District.

Besides the great emphasis attached to the soil conservation campaign, Departmental staff also carried out other campaigns in their appropriate seasons. Early in the year it was for planting sweet potatoes. This was severely handicapped by the weather and by lack of planting material; after the harvest for the collection of stover, to augment fodder and manure; later a widespread manuring campaign just before planting which elicited a very satisfactory response; finally an early weeding drive soon after the first rains.

Rehabilitation and reclamation projects utilized a great deal of man-power, particularly in Singida, Kondoa and Manyoni, where various anti-tsetse bush clearing undertakings were carried out. In Singida the clearings formed part of a far reaching scheme to protect the whole of the district within a belt of cleared and if possible occupied land along a geographically convenient perimeter. Settlements outside the defence line would be drawn within the perimeter and over-populated areas within this line would be thinned out to provide settlers for holding down regeneration in the cleared belt. The work accomplished in Singida during the year totalled seventy-five square miles of clearings and re-slashing representing a communal turnout of 300,000 man-days. Another rehabilitation scheme dealt with the lower slopes of the hills just south of Dodoma, which had deteriorated into typical "bad lands" country, deeply dissected by gulleys. A sum of £500 was allocated to this scheme, which was an interdepartmental one drawn up by the Provincial Administration, Veterinary and Agricultural Departments with the Agricultural Officer, Dodoma, acting as executive officer.

Resettlement schemes have been found necessary for various reasons. In Singida and Kondoa isolated settlements exist in tsetse bush where recent cases of sleeping sickness has made it essential to move the scattered population into safe areas. Plans to this end were drawn up and various reception areas were prepared and the bush cleared as explained above. In Manyoni the threatened invasion by tsetse of the Bahi depression, which contains a large stock population, necessitated clearing a barrier on the Saranda scarp. This

clearing actually provided far more suitable arable land than existed in the adjoining Bahi depression, and for the dual purpose of moving non-stock-owning people from these very precarious conditions in the depression and at the same time settling the cleared barrier at a sufficient density to suppress regeneration, a general migration of non-stock-owning families was encouraged to the top of the scarp. By the end of the year six hundred and eighty-five families had been persuaded to undertake this move and were settled at a density of ten acres per family.

Another reason for moving the population is that density has become too heavy for the land in question, and if such land is easily erodible, as is the case on the Irangi Plateau, then a thinning out is essential in the interests of soil conservation. A large scheme, known as the Chungai-Filimo Scheme, was drawn up in the Kondoa Irangi District whereby one thousand families were to be moved off the Irangi Plateau on to suitable land at the eastern base of the plateau. This reception area had recently been cleared as a tsetse barrier, and it was unfortunate that the supply position in regard to materials such as waterpiping interfered with the programme; thus the non-arrival of the piping necessary for providing domestic water in this new area necessitated postponing resettlement except in the case of some forty-six families who moved in permanently and one hundred and forty-nine who made a start with building their houses.

The work of extending and maintaining water supplies is carried out by Native Authorities with the help and supervision of the Administrative, Veterinary, Agricultural and Water Development Departments. The programme included the cleaning out or digging of thirty-one "hafir" dams, sinking eleven wells, and the construction of a $2\frac{1}{2}$-million gallon dam at Dodoma for the town's dairy herd.

The Groundnut Commission visited the Province early in August and spent one day on the reconnaissance of the southern fringe of the area north of the Kiboriani and the Mlali blocks in the Mpwapwa District. Although excellent yields of groundnuts are obtainable along the fan slopes of the above blocks, the Departmental officers who had carried out earlier reconnaissances into the tract of country extending to Zoissa were not at all confident that similar yields could be expected away from these fan slopes, and advised the commission accordingly. Towards the end of the year, however, Mpwapwa was actually selected as the area in which the first fifteen groundnut units would be cultivated, and work was started on constructing the camp for the advance party of the groundnut project.

Lake Province

The Agricultural staff in the Lake Province consisted of the Senior Agricultural Officer, an Agricultural Officer and an Agricultural Officer (Ginnery Inspector) stationed at Mwanza, Agricultural Officers at Bukoba, Shinyanga and Musoma (for seven months only), an Agricultural Assistant at Biharamulo, another Agricultural Assistant as Coffee Grader at Bukoba, and a third Agricultural Assistant stationed at the Ukiriguru Experimental Farm. The Empire Cotton Growing Corporation was represented by a Chief Scientific Officer stationed at Ukiriguru and a Senior Scientific Officer stationed at Lubaga, Shinyanga. An Education Officer at the Agricultural Training School at Ukiriguru and three Crop Supervisors completed the European Staff. African staff comprised three African Agricultural Assistants, an African Surveyor,

twenty-six Recorders and seven Overseers on Experimental Stations, seven Teachers at Ukiriguru, eighty-four Local Civil Service Agricultural Instructors, one hundred and ten War Production Staff Instructors and eight Coffee Graders. In addition one hundred and seventy-five African Instructors were employed by the Native Authorities.

Generally speaking the weather at the beginning of the planting season was good, but drought followed in January and February, and in some areas extended into March or mid-April. The rains when they returned in April and May were, however, too late to be of much benefit except to root crops, cotton, coffee and some food crops in Bukoba and Biharamulo.

Self-sufficiency in regard to food crops varied between the different districts. Bukoba and Biharamulo were able to feed themselves, but in Musoma food was short in the south-east, while in Shinyanga a serious food shortage in the east had to be dealt with by the issue of famine relief. In the remainder of Sukumaland the grain crops were generally poor and only root crops saved the situation.

Of the grain crops, only 1,203 tons of maize in the Musoma District and 417 tons in the Mwanza District were purchased. Paddy production fell off greatly and only 1,341 tons were marketed, this being the smallest crop for many years. Surplus cassava was also brought to the markets and 1,300 tons were sold.

An increased acreage of cotton was planted in the Mwanza District, and in Musoma a record crop of 2,900 bales of lint was produced. The total output for the Province was 33,817 bales, and the production of seed cotton according to districts was as follows:—

	Tons
Mwanza	14,586
Musoma	1,614
Maswa	1,439
Kwimba	4,025
Shinyanga	874
Total ...	22,538

Bukoba only produced approximately half its usual crop of coffee and exports for 1946 totalled 4,540 tons. The quality of the crop was poor because of the many defective, shrivelled beans, induced by the absence of rain at a critical time in the formation of the bean. The Ngara coffee crop amounted to 152 tons, partly due to the general improvement noted on the coffee trees which had been converted to the "Multiple Stem" system.

In Biharamulo the poor crop of 48 tons of fire-cured tobacco, was the result of various factors including adverse weather, a reduction in the numbers of growers and also to heavy damage by hail and red rust.

Only 251 tons of groundnuts were produced, though the shortfall of this crop was partly offset by a production of 700 tons of chick pea. In addition there was a 400-ton crop of soya beans in the Karagwe area (Bukoba): Bukoba also supplied 370 tons of Irish potatoes and 221 tons of citrus.

The storage of food in those areas unable to rely on cassava, i.e. areas with heavy soils, is being encouraged, and temporary native types of grain stores were erected at various centres in the Maswa, Shinyanga and Kwimba Districts as a preliminary step in the implementation of this policy. In due course these temporary structures will be replaced by permanent stores.

Improvements in the agricultural practices of the various tribes continued to be encouraged. Good progress is reported from Buguh in the campaign to convert coffee pruning to the "Multiple Stem" system; and from Bukoba in the coffee mulching campaign. In Sukumaland unremitting propaganda on the benefits and necessity of manuring and the collection of stover makes only slow progress. To this is added advice to increase the resting period under fallow, and also to the use of the plough particularly on the heavier land, which not only spares up more of this type of land, thus relieving some of the lighter land for fallow, but also enables the cultivator to prepare his land and have it ready for planting in a much shorter period of time. The encouragement of the plough will, however, be confined to heavy land, and to this end "plough rules" have been prepared which will prohibit the use of the plough on light soils.

A series of demonstration plots has been established in each district in Sukumaland, run by peasant demonstrators who have agreed to carry out all the major better farming practices advocated for that part of the country, for which service the demonstrators receive tax exemption plus an ox at the end of the harvest. The introduction, multiplication and widespread distribution of seed is another important Departmental function, and a preliminary multiplication of two paddy varieties ("Kahogo" and "Kilombero Afaa 1/18") was begun in two villages in the Mwanza District. Another improved crop variety which is being multiplied is a new cotton, or rather a mixture of cotton strains known as UK 46, which under experimental conditions has shown an improvement of twenty per cent over the present Lake Province cotton, MZ 561 and promises to be particularly useful in a bad jassid year. Besides these multiplications supplies of chick pea and large supplies of various types of short-term sorghums were sent to North and South Mara, Shinyanga and Maswa.

Soil conservation work progresses in the various districts, the most outstanding progress being in the South Mara area where tie-ridging has now been developed for some years. In Sukumaland a Native Authority rule exists for the enforcing of tie-ridging, and although the requirements were modest (each homestead to tie-ridge half an acre of land) there has been a very poor response as yet in the adoption of this practice. Contour hedging is the principal soil conservation measure in Bugufi, and a further 75 miles of hedging were completed by communal turnout.

1946 saw the inception of the Provincial Committee, which is assisting in co-ordinating provincial policy. The principal activity has been in planning, fact finding and general preparation for the Sukumaland Team, which will carry out the actual executive functions of the Sukumaland Development Scheme. A great deal of mapping, for instance, has already been completed showing village boundaries, existing bush areas, soil types, population and stock densities, as well as proposed new water supplies. Such information has already proved useful for categorizing villages in the Karuma, Buchosa and Ukerewe chiefdoms as to whether they should be completely closed to immigration, be open to settlement, or should only allow immigrants in proportion to the number of families leaving. For this purpose permit books are supplied to the Native Authorities and settlement can only be allowed to those in possession of a permit.

The provision of water will, in fact, be one of the most important functions of the Sukumaland Team and much consideration has been given to this aspect,

particularly to the type of mechanical equipment which should be employed. In North Mara, the Native Authorities are already so impressed with the importance of increasing water supplies that they have approved a £24,000 scheme for running two mechanical units during the next five years. Actual works completed within the Province in 1946 included three large Water Development Department dams at Malya, Shishiu and Tinde, built with contractors' machinery and in addition several "hafirs" were dug in Mwanza and Maswa by the Native Authorities.

The Agricultural Training School at Ukiriguru was run under great difficulties, but the number of students was increased from 70 in 1945 to 112 in 1946. Arrangements are completed for the construction in 1947 of the new and much enlarged school buildings.

Southern Province

The staff disposition included the Senior Agricultural Officer and an Agricultural Officer stationed at Lindi, an Agricultural Officer at Songea, an Agricultural Assistant at Masasi and another one at Kilwa and a Crop Supervisor at Tunduru. The African staff consisted of forty-two Local Civil Service Instructors, thirty-three War Production Staff Instructors and eleven Native Authority Instructors. The Songea District Native Tobacco Board also employed thirty-five Instructors for tobacco work.

Bad distribution of the lowest rainfall on record proved all but disastrous to most of the crops in the coastal districts of the Province. Further inland conditions were slightly better, and in Songea the season was fair, with an average total rainfall, though poorly distributed over the growing season.

Following the worst season in living memory, supplies of staple foods were very scarce and some areas were on the verge of famine. Fortunately the constant enforcing in previous years of the policy of maintaining adequate reserves of cassava enabled the Province to meet its own food requirements, and the Newala and Mikindani districts were drawn on to supply the areas suffering acute food shortages including the shipping of 1,870 tons to Kilwa. Grain harvests were generally very poor so that for the first time the Province had no surplus grain for export, and was even unable to find sufficient grain for the requirements of the urban and estate labour, which had to exist on cassava flour. Rice failed in all but a few favourable places and the "black-market" price of Shs. 1/50 a kilo successfully kept the small quantity harvested off any recognized market. Wheat grown in the Songea District amounted to 418 tons.

There was an export of 2,976 tons of sesame, but this included a carry over of about 1,000 tons of the 1945 crop. 1945 exports totalled 3,224 tons and in 1944 totalled 2,654 tons. There was only a small export of groundnuts, also a carry over from 1945, and the small crop harvested in 1946 was sufficient only for local use. The actual tonnage exported was 373 tons compared with 1,756 and 954 tons for the two previous years. Copra exports totalled 635 tons compared with 1,756 and 954 tons for the two previous years.

The reduction in the number of coconuts available for copra manufacture was partly due to the climate, but also due to the increased consumption of nuts induced by the general shortage of food.

Sisal production was considerably reduced in comparison with the previous four years, partly caused by shortage of leaf and by shortage of labour, though lack of water played a major role in the diminished output :—

	Tons
1942 ...	13,514
1943 ...	13,373
1944 ...	13,163
1945 ...	11,285
1946 ...	9,817

Cotton planting had to be delayed until late in the season because of the complete absence of rain during the normal planting months. A very poor crop was thus harvested, totalling 160 tons of seed cotton, purchased mainly in the Tunduru and Mikindani districts. Comparative production in tons of seed cotton with previous years was as follows :—

	1944 Tons	1945 Tons	1946 Tons
Kilwa	135	61	8
Lindi	128	140	20
Mikindani	100	120	67
Masasi	4	34	3
Tunduru	60	72	62
Total ...	427	427	160

The Songea tobacco crop was fair, with quality up to average. Three hundred and fifty-two tons were purchased from the growers, of which 266 tons were available for sale after processing. In addition to the above, there was an export of 185 tons of native roll tobacco, the product mainly of the Tunduru District.

Of the wild crops which form valuable items in the economy of the Southern Province are wild rubber, of which 46 tons were exported against 118 tons in the previous year. Gum copal, totalling 196 tons, an improvement over the 113 tons exported in 1945. Colombo Root, which dropped considerably from 346 tons in 1945 to 73 tons in 1946, a reduction attributed to climatic conditions. Wild starch obtained from the plant *Tacca pinatafida* totalled 100 tons. Bees-wax collection made a striking increase, accounted for mainly by the poor returns obtained from the normal cash crops inducing more people to go out in search of wax. The amount exported totalled 331 tons compared with 45, 112, 151 and 149 tons over the preceding four years.

Erosion in this sparsely populated Province is not a major problem, but steps are being taken to restrict cultivation on steep slopes, and to encourage the adoption of tie-ridge cultivation on other sloping land. In Songea this practice has been adopted on a wide scale and a large proportion of the fields are now tie ridged.

The movement and concentration of the people of the Liwale districts to Njinjo and Kikole in the Kilwa District had to be severely curtailed because of the failure of the main rains and the acute shortage of food.

The Groundnut Commission visited the Province in August, and after a quick visit to the selected area, followed by an aerial reconnaissance over it as well as over many hundreds of square miles of adjoining country, they were satisfied that there would be available several millions of acres of uninhabited land suitable for the production of groundnuts.

The Senior Agricultural Officer and one Agricultural Officer was stationed at Tabora, an Agricultural Assistant at Mwanhala (Nzega) and another at Kasulu, a Crop Supervisor at Kigoma, a Field Assistant at Kahama. African staff consisted of four Overseers, twenty-four Local Civil Service African Instructors, eighty-three War Production Staff African Instructors, and two Beeswax Instructors. A further thirty-four Instructors were employed by the Native Authority, supervised by Departmental Officers.

Although the total amount of rainfall was above the average, the distribution was very unfavourable. The rains started late, were followed by prolonged droughts in February and March, and resumed with heavy falls concentrated into the last month of the season when only cassava could derive much benefit.

The general food position during the year was one of minor local shortages, but with a total sufficiency in the Province providing also a surplus of cassava, maize and groundnuts for export. This surplus maize was mainly produced in the Malagarasi delta, and the quantities marketed totalled 1,140 tons. Other grains were in very short supply, and only 160 tons of millets were sold on the produce markets. Rice suffered considerably from the effects of the drought, but some of the better-watered valleys managed to produce a total of 621 tons of paddy for sale. Small dams for the purpose of irrigating rice during dry spells in the main season would save a crop in years such as 1946, and a start has been made in the Tabora District to establish such small dams.

Cassava is the food reserve of the Western Province, and constant administrative pressure is applied to ensure that all areas have adequate acreages planted each year. The drive in 1946 for an increased acreage was particularly successful in the Tabora and Nzega districts. Sales during the year totalled 2,210 tons as compared with 2,000 tons in 1945 and 337 tons in 1944.

The encouragement of haricot beans in the Kasulu District continues, but the season was not a very favourable one and only 31 tons were marketed. Mixed beans in Kasulu and elsewhere in the Province also suffered from the drought with only 136 tons being sold.

The groundnut crop was reasonably good in the Tabora District, but poor in Nzega and Kahama. Eight hundred and thirty tons were marketed, as compared with 1,187 and 720 tons in the two preceding years. Another oil seed crop which is now receiving active encouragement is palm oil in the Kigoma District. The Luiche Valley carries an estimated twenty thousand palms, which produce approximately 50 tons of peri-carp oil and could produce 100 tons of kernels if these were not thrown away. A revival of the marketing of the kernels this year resulted in an export of 17 tons.

Beeswax collection was on the increase again and a total of 222 tons of wax and 109 tons of honey was exported during 1946 (the 1945 figures were 126 tons of wax and 133 tons of honey). Gum Arabic exports remained approximately the same as for the previous year at 390 tons.

It was decided by the Provincial Committee that the approach to soil conservation should be through declared "soil conservation areas" in which the prescribed practices would be tie ridging uncultivated strips along roads and

gulleys, controlled grazing and contour banks where necessary. As a preliminary measure four such areas have been selected and declared, and in the one chosen near Tabora twenty-two thousand yards of contouring has been demarcated and thirteen thousand yards of contour banks built.

Agricultural propaganda has concentrated on increased production, more particularly by building up soil fertility with the use of manures. The campaign for manuring has in fact been more successful than ever before, and the collection and use of stover both for increasing the manure in cattle "bomas" and for providing additional feed, is being extended. Demonstration plots have been started in the Tabora District, and thirteen such plots have been laid out at Native Authority headquarters to give visual comparison of good and bad farming methods, the good farming including manuring, tie-ridging and early weeding.

The Groundnut Commission visited Tabora in July and inspected various areas in company with the Senior Agricultural Officer, Tabora, the Senior Agricultural Officer, Mwanza, and the Agricultural Officer, Tabora. The attention of the Commission was drawn to the unreliability of the distribution of the rainfall, and the advice tendered as to the range of groundnut yields which could be expected in the Western Province was on a very cautious side.

Southern Highlands Province

The Agricultural staff in the Southern Highlands Province consisted of the Senior Agricultural Officer and an Agricultural Officer stationed at Iringa, an Agricultural Officer at Mbeya, an Agricultural Assistant at Tukuyu, a Tobacco Officer at Iringa, and a Crop Supervisor in Mbeya. Brigadier W. E. H. Scupham, C.M.G., M.C., acted as Chairman and Executive Officer of the Iringa Production Committee. The African staff comprised thirty Local Civil Service Instructors, thirty-four War Production staff, three Overseers and one Recorder. The Native Authorities provided an additional fifty-two Instructors.

Reduced total precipitation and a poor distribution of the rainfall was experienced in all districts of the Province. Drought conditions in January and February were followed by patchy rain which in some areas was insufficient to bring the crops to maturity. Food supplies were, however, adequate for native requirements with the exception of parts of the Mbeya and Iringa districts, and the shortfalls in the food requirements for fed labour, approximately 1,700 tons, was met partly from the Rungwe rice crop.

Of the grain crops, maize was generally poor throughout the Province and in some areas was a complete failure. The only part where maize was successful was in the higher altitudes, where conditions normally are too wet for the satisfactory growth of this crop, so that these good yields offset to a certain extent the poor harvests obtained elsewhere. The amount of maize brought to the various markets totalled 3,596 tons as compared with 5,244 tons in 1945.

The production of rice, the greater portion of which is carried out in the lake-shore area of the Rungwe District, was considered satisfactory, with 2,801 tons actually marketed and a further minimum of 1,000 tons sold across the border in Nyasaland.

Wheat grown by the African is on the increase in the Mbeya and Njombe districts, but the crop at present is all used for food. European production on the other hand is confined to the Iringa District and the acreage planted

in 1946 was on a reduced scale. Yields were a little better than in 1945, but still very poor, averaging under two bags an acre. The amount marketed totalled 99 tons compared with 110 tons in 1945 and 28 tons in 1944.

Other native-grown food crops include eleusine, which is used mostly for beer, though 153 tons were marketed during the year. As the cultivation of this crop by the traditional native method is most wasteful of bush and land, and also frequently causes bush fires. Native Authority rules have been passed which will in future forbid the growing of eleusine by this method of felling and heaping bush and trees to be subsequently burnt for the ash.

European potatoes were favoured by the dry conditions, which reduced the incidence of blight in the Mbeya nad Rungwe districts, though not in Mufindi. The production by natives was 244 tons, with an additional 100 tons produced by non-natives.

The bean and pea crop was satisfactory considering the dry conditions, the total of these two crops being 245 tons compared with 298 tons in 1945. Sunflowers have been introduced as a cash crop for natives and some two hundred acres were planted.

The production of pyrethrum showed a further increase over previous years, as indicated below :—

	Grade I lbs.	Grade II lbs.	Grade III lbs.	Total lbs.
1944 ...	— ...	— ...	— ...	482,731
1945 ...	— ...	— ...	— ...	988,494
1946 ...	897,844 ...	165,354 ...	3,362 ...	1,066,560

Adverse weather and a falling off in the local demand for tobacco at the beginning of the year resulted in a drop in production of more than half a million lbs., as shown in the accompanying table :—

	lbs.
1943 ...	1,132,731
1944 ...	1,523,669
1945 ...	1,537,903
1946 ...	1,026,464

There has been a further incraese in the output of tea. This was largely the result of further acreages coming into pluck, which has tended to mask the effects of unfavourable rainfall on some of the tea estates. Comparative figures show the steady increase in the production of made tea :—

	lbs.
1944 ...	737,207
1945 ...	879,714
1946 ...	1,141,727

The enactment of new soil conservation rules and the appointment of staff to enforce the carrying out of these rules is already proving effective in obtaining the adoption of soil conservation measures. The new rules include such points as the prohibition of the cultivation of eleusine by burning trees; the control of grass fires by deliberate early burning; terracing of native cultivation; the prevention of cultivation near roads, gullies or headquarters of streams; and the application of manure. In the case of non-native cultivation of maize, the payment of a maize grant was made conditional on the applicant for a grant having carried out adequate measures against soil erosion. It is of interest to record the action of an ex-Agricultural Instructor who has set himself up as a "Soil Conservation Adviser", and who manages to earn a living by marking out contours and irrigation furrows on native land.

Eastern Province

The Agricultural staff in the Eastern Province consisted of the Senior Agricultural Officer and an Agricultural Officer stationed at Morogoro, an Agricultural Officer stationed at Mahenge (for nine months), a Senior Agricultural Assistant at Bagamoyo and another at Kilosa, an Agricultural Assistant at Morogoro, at Kiserawe (three months) and at Utete (two months). A Senior Scientific Officer was in charge of the Ilonga Experimental Station and was stationed in Kilosa. A Field Officer and two Crop Supervisors completed the European staff. African staff consisted of seventy-four Local Civil Service Agricultural Instructors, ninety War Production Staff Instructors and seven Copra Instructors.

A virtual failure of the 1945/46 short rains was followed by one of the poorest long rains seasons ever experienced. In the Rufiji District the rainfall was less than half the average, and when this was accompanied by negligible flooding of the Rufiji Valley the failure of a great proportion of the annual crops was inevitable. The absence of flooding in the Wami and Ruvu rivers did, however, enable good crops of paddy and maize to be harvested.

Following the above extremely poor seasons, famines were experienced in the Rufiji District and in parts of the Uzaramo and Morogoro districts. Elsewhere food was adequate, but a great deal of what was marketed passed through the "black markets" rather than through the recognized channels. A comparison of various food crops sold on the normal markets over the past three years indicates the sharp decline that has taken place as a result of the poor season and "black marketing" :—

	1944 Tons	1945 Tons	1946 Tons
Paddy	6,894	780	427
Rice (hand-hulled)	890	178	123
Maize	8,767	4,369	1,920
Sorghums ...	2,725	512	103
Pulses and Mixed Beans	1,286	629	219
Potatoes ...	55	17	220
Cassava	259	1,368	155
Total ...	20,876	7,853	3,167

The unusually dry season favoured the potato crop by reducing considerably the incidence of late blight (*Phytophthora infestans*). The production of vegetables has increased in the Morogoro District, where it is mainly a native industry, and produced 473 tons in 1946 as compared with 324 and 265 tons during the preceding two years. Production in Kilosa, entirely non-native, declined slightly to 300 tons.

Cotton production increased over the two previous years, and totalled 6,215 bales for the Province. This was in spite of a very low output from the Rufiji District, where all available flood lands had first to be used for planting maize and cowpeas to alleviate the famine. The quality of the early pickings was exceptionally good, but unseasonable showers at the end of September soon increased the stainer population and raised the percentage of stained

cotton. Purchases of cotton in the various districts in tons of seed cotton were as follows :—

	1944	1945	1946 AR	1946 BR	Total
Morogoro	739	406	716	145	861
Kilosa	557	518	546	167	713
Ulanga	613	748	739	147	886
Bagamoyo	287	275	327	67	394
Rufiji	950	993	130	21	151
Uzaramo	30	5	10	3	13
Total ...	3,176	2,945	2,468	550	3,018

Due to the increased consumption of fresh coconuts and to the dry weather the marketable surplus of copra was considerably reduced, and only 4,637 tons were sold as compared to 5,448 in 1945 and 4,663 in 1944. The quality of this copra shows little or no improvement, and the demonstrations and propaganda undertaken to teach the better preparation of copra are largely nullified by the persistence of the local traders in buying inferior quality copra at very little under good-quality copra prices, encouraged in turn by the oil millers who habitually pay the same price irrespective of quality. Plant sanitation in the coconut groves has made some steady progress, but not without considerable pressure and the adoption of legal proceedings against the more obdurate owners. The importance of unremitting attention to plant sanitation is shown in the case of the Northern Rufiji, where the absence of any permanent European agricultural staff during the past seven years has resulted in an outbreak of coconut beetle developing on a serious scale.

Sisal production in the Eastern Province has steadily improved in spite of labour shortages and the adverse season. The output in tons of sisal over the past five years is shown below :—

	Tons
1942 ...	26,000
1943 ...	26,808
1944 ...	31,717
1945 ...	33,985
1946 ...	34,825

Oil seeds do not form an important item in the agriculture of the Eastern Province, and the unfavourable season has decreased the output of groundnuts and sesame, at 45 and 224 tons respectively, to about fifty per cent of the average annual production.

Brown sugar production (jaggery) was estimated to have totalled 1,100 tons, and shows a steady increase. This is a non-native industry undertaken by numerous small estates owned mainly by Indians.

Other crops include cashew-nuts, 218 tons; kapok, 220 tons, an exceptionally good yield, with castor, the price of which increased from 14 cents to 30 cents per kilo and stimulated collection to 342 tons; gum copal, 57 tons; native tobacco, 130 tons; and Indian arrowroot (*Tacca pinatafida*), 3 tons; which represents a good index of the food position in the Uzaramo District, and in normal years has been a useful cash crop totalling 150 to 240 tons.

Soil conservation work in the Ulugurus has made greater progress with the increase in the number of striding levels used in the district. The contours constructed with these levels are planted up with *Kus-Kus* grass or with bananas. Greater encouragement is being given to the latter system because bananas have the advantage of being a food crop, and the cut stems layed

lengthwise behind the line of banana plants gives added protection against soil wash. Bush fires have not been so prevalent during the past year, and this is attributed to changing the penalty for those convicted of starting fires from fines to imprisonment. In the Kilosa District a live fire break of wattle, forty-six miles in length, was planted in the Ukaguru mountains in an endeavour to prevent the spread of grass fires from the plains up into the mountains.

In Kilosa the Senior Agricultural Assistant surveyed and supervised the construction of an irrigation furrow at Kidai. This undertaking was carried out with communal labour and included a three-mile long furrow with a well-sited and soundly constructed intake. About two hundred acres of very fertile land has thus been brought under irrigation, and the area has been subdivided into one and a quarter acre plots for the use of those who co-operated in the undertaking.

EXPERIMENTAL WORK

Coffee Research and Experimental Station, Lyamungu.—The experimental work on the station was considerably hampered by the low yields, and in some cases the complete absence of a crop, resulting from a very unfavourable season and the heavy yields carried in 1945.

Of the trials which gave any tangible results the one comparing the multiple stem system of pruning with the single stem system continued to demonstrate the advantages of the former. The mulching trial also showed increased yields obtained from mulching with banana trash as compared with clean weeding and with composting. The application of sulphate of ammonia in conjunction with mulch, however, again depressed yields (it was only in 1945 when the rains were exceptionally heavy, that the application of sulphate of ammonia in conjunction with mulching proved beneficial). The clonal variety trials were extended on the station and one trial was planted at Kirua Vunjo. The number of clones now under trial is sixty-five, occupying a total of fourteen acres.

Facilities for the vegetative propagation of high-yielding trees were increased, and the frames now have a capacity for striking a total of thirty-thousand cuttings.

During the period under review, Mr. S. M. Gilbert retired from the office of Chief Scientific Officer. Mr. Gilbert had been in charge of the station since its inception and the success of the experimental work has been almost entirely due to his enthusiasm and initiative. Mr. Gilbert's services were recognized in the Birthday Honours by the award of the O.B.E.

Sisal Experimental Station, Mlingano, Ngomeni.—The dry weather of 1945 lasted over the first eight months of 1946 and thus constituted the most prolonged drought experienced since the inception of the station in 1935. The growth of the sisal steadily declined as the drought intensified, reaching a climax in March. At this time growth was almost at a standstill, irrespective of cultural conditions, but the plants did not collapse. Heavy rains during September and October revivified growth besides raising the total rainfall for the year to 47·6 inches, or the average for the past eleven years.

No new trials were planted during the year but unfavourable seasons in conjunction with damage caused by the sisal weevil (*Scyphophorus acupunctatus*) necessitated the replanting of one external trial at Amboni. Two other

external spacing × cutting trials situated at Rudewa and Kingolwira, on the Central Line made fairly satisfactory progress. The sisal at Rudewa has tended to produce slightly longer leaf than that at Kingolwira. A new nursery was planted at Mlingano for future requirements.

The present series of ten trials at Mlingano deal with the cultivation, spacing, cutting and manuring of sisal; six of these represent original experiments which are now in their second cycle. To date fibre yields in the second cycle compare unfavourably with those obtained during the first cycle on virgin land which may be attributable partly to declining soil fertility. Continuous clean weeding has resulted in the soil becoming almost devoid of any natural cover. On the other hand any degree of weed competition continued adversely to affect young sisal planted in close single rows particularly during dry spells.

The Fertility Trial (1944) provided an exception to these findings. In this case the sisal was planted in double-rows separated by an interval of four metres. The treatments included clean cultivation by disc-harrowing, intercropping with a recumbent leguminous cover crop (*Glycine javanica*), and interplanting elephant grass (*Pennisetum purpureum*). Despite the drought, no significant differences were observed in either the growth rates or the first cutting fibre yields of the first two treatments. The strips of cover crop between the double-rows of sisal provided a good anti-soil erosion measure. Intercropping with elephant grass for two years markedly retarded the sisal and reduced fibre yields. A first cutting was taken when the sisal was two years old after it had unfurled about ninety leaves since planting out. As expected, both the yield of fibre and the percentage of fibre in the leaf were low. Early cutting represents a combined harvesting and cultural operation and subsequent maintenance was greatly facilitated. In due course the practice may lead to better yields and higher fibre percentages.

Poling commenced in the 1942 spacing × cutting trial. It was chiefly confined to plots planted in single rows at the lower plant populations, or those where the commencement of cutting had been delayed until three years from planting. Poling was not so evident in double-row sisal which had made slightly slower growth.

The manurial experiments continued to show little response to artificial fertilizers applied during the initial three years of the sisal. All these trials are sited on land which had previously carried one cycle of sisal.

A comparative trial of selected F_1 generation hybrids, raised at Amani, was cut for the first time. Four of the selections gave satisfactory yields as well as fibre of good length and fineness. Back-crossing of F_1 hybrids raised on the station proceeded during the year over two thousand seedling plants were raised in a nursery.

Dr. P. I. Wilson, Research Chemist, of the Department of Textiles, Leeds University, worked at the station throughout the year studying the relationships between the vegetative development of the sisal plant and its fibre characteristics.

Cotton.—Cotton experimental work is carried out at three experiment stations, each under the charge of an officer of the Empire Cotton Growing Corporation. The Chief Scientific Officer is in charge of the Ukiriguru Station, with Lubaga (Shinyanga) and Ilonga (Kilosa) each under the charge of a Senior Scientific Officer.

The main objective in the cotton breeding work at the two Lake Province stations is the development of greater jassid and blackarm resistance than is provided by the original "Local" strain, and by strain Mz. 561 which succeeded it. At Ukiriguru the best strains in the trials carried out on the lighter hill soils were UK. 3 17, yielding at the rate of 486 lbs. lint per acre (an increase of 37 per cent on Mz. 561) and L 2 62 yielding at the rate of 445 lbs. lint per acre (an increase of 26 per cent on Mz. 561); while on the heavy "mbuga" soil trial UK. 4 53 was the best strain, yielding at the rate of 680 lbs. lint per acre, representing a 28 per cent increase on Mz. 561 and UK. 3/33 yielding at the rate of 620 lbs. lint per acre, an increase of 18 per cent over Mz. 561. These strains have also shown up well in similar trials at Lubaga.

A cotton seed mixture comprising seven strains, with UK. 3 33 and L. 2 62 forming the main ingredients, has been issued for multiplication on about one hundred acres in Uzinza, and represents the first of a series of seed mixtures intended to improve the jassid resistance and general yielding qualities of Lake Province cotton. From lint and ginning figures and such spinning information which is as yet available, these strains should be as good as, if not somewhat better than Mz. 561, though it is hoped that later issues will consist of more uniform material, with possibly some measure of resistance to blackarm disease (*B. malvacearum*).

In addition to the development of the above Ukiriguru and Lubaga selections of the general Mz. strains, studies were also made of other types. Of these Barberton U4 × Cambodia crosses were of interest though their lint quality was slightly lower than that of the Mz. strains. BC. 52 lots yielded well with at least reasonable jassid resistance, and if a higher quality lint than that obtained from the Mz. types were required strains supplying it might be found in this material. The Barberton U4 × Sea Island crosses again did not look settled at Ukiriguru, lacking vigour and showing greater susceptibility to blackarm damage.

Studies on the maintenance and restoration of soil fertility were continued at both Ukiriguru and Lubaga, and included manurial as well as land resting trials. At Ukiriguru the manurial trials have shown that the residual responses from manuring are greater than was at one time thought to occur, and the following table summarizes the extent to which residual benefits have survived into the third season :—

	1st year response (Bulrush Millet) As % of Control	2nd year residual benefit (Bulrush Millet) As % of Control	3rd year residual benefit (Seed Cotton) As % of Control
Trial laid down	1945–46	1944–45	1943–44
Control	100 (560 lbs. per acre)	100 (500 lbs. per acre)	100 (700 lbs. per acre)
3 tons compost	150	—	—
3 tons farmyard manure ...	—	110	—
7 tons farmyard manure ...	—	145	140
3 tons cotton seed ash ...	—	—	150
1½ tons cotton seed ash ...	—	130	—
400 lbs. Uganda rock phosphate ...	130	—	—

The land resting trials at Ukiriguru have shown some very important and somewhat disturbing results. The first-year results (1945 harvest) from a millet-sorghum mixture gave a 30 to 40 per cent increase on the plots which had been under a three year elephant grass ley, grazed only prior to digging in.

The elephant grass plots manured at five tons farmyard manure per acre gave a 60 per cent increase, which was the same as the increase obtained on the continuously cropped bulrush millet manured at five tons per acre. In 1946, however, the second year of the cropping cycle, the only increases of seed cotton are the second year residual benefits from the manurial applications. *It would appear that no benefits from the resting crop treatments have carried over into the second year of the cropping cycle.* In fact, soil structure and other tests very kindly carried out by Dr. W. S. Martin in Uganda on samples of Ukiriguru and Lubaga soils, have shown that under none of the treatments was there any improvement in soil structure. It seems, therefore, that on sandy granitic soils at Ukiriguru the benefits of a resting crop are merely those derived from the incorporation of green material, and that these benefits are rapidly dissipated within one year, as has already been demonstrated in earlier green manuring trials.

The value of tie-ridging in conserving not only the soil but also soil moisture, was again confirmed at Ukiriguru and Lubaga under last season's very poor rainfall, and although the grain crops could not be saved, the cotton yield differences between cotton planted on the flat and planted on tie-ridges were striking. Work on these tie-ridging experiments is now being extended to district plots.

Millet and sorghum are the principal grain crops in the area served by Ukiriguru and Lubaga, and the improvement of these crops forms part of the programme of these stations. At present the main objective is to find quick-maturing strains which are not only good yielders, but also good types for storing, as in years of poor rains such quick-maturing types would have real value as an insurance against complete crop failures. During 1946 the Swaziland sorghum P. 41 was outstandingly good, and where the local medium late "Bukura mabemba" yielded only 300 lbs. per acre, and even "Dobbs", a good medium early variety, yielded no more, "Swaziland P. 41" gave 2,000 lbs. per acre. Feterita selections yielded at the rate of 1,500 lbs.

The value of clean weeding on the control of *Striga hermonthica* was demonstrated on a trial at Ukiriguru where the clean weeded plots yielded 313 lbs. per acre, and the control only 23lbs. per acre.

Work on the Ilonga Station near Kilosa was largely in the nature of preliminary development and a further one hundred and fifty acres of land to be used for experimental purposes was cleared and surveyed.

Experimental and breeding work consisted of three spacing trials, all of them giving no results owing to the poor stands obtained, and of variety and strain trials. The variety trial of the previous three years was planted again, one at Ilonga and similar ones of six different district plots. Insect attack was very variable over this series of trials, but a combined analysis showed that M.U.8A (selection from Malwa Upland) and B.38/9 (selection from Eastern Province Local) were significantly better in yield than Local. The differential attack of American bollworm was again noted, larvae being found in much greater numbers on M.U.8A than on the other varieties.

Strain trials tested five promising selections from Eastern Province Local and B.P. 52, the trails being carried out at Ilonga and on three district plots. G. 38/7 gave consistently higher yields than Local whilst maintaining the quality of Local. Other selections of the Local type and re-selections of Barberton Sea Island × U4 crosses were also grown.

Records were maintained of the incidence of the principal cotton pests, and 1946 was found to be much better than 1945 from the point of view of insect pests, stainers in particular. An analysis of the percentage of flowers set and of bolls shed was made [illegible] hundred plants and showed as in 1945, that the loss of bolls due to bollworm was 28 per cent.

Mwanhala and Tumbi Agricultural Development Centres, Western Province.—In 1946 the two stations embarked on a new phase of development, and received money for capital and recurrent expenditure from Development Funds. The future policy of the two stations is to carry out experiments to investigate the problems of soil fertility and to demonstrate methods which African cultivators may easily adopt to maintain fertility, as well as to continue with the functions of a seed farm for the multiplication and distribution of improved seeds and planting material. Controlled and rotational grazing will also be practised when the menace of tsetse fly has been tackled. To this end some two hundred acres of bush was cleared at Mwanhala, and a large clearing was established on the north and east boundaries of the Tumbi farm. Other preliminary development work included the completion of a new house, a new office and a new tool store, all built during 1946 at Mwanhala.

While the stations are in the early stages of re-organization the experimental programme was limited to the six experiments already in progress. One of these is a land resting trial, and as it was only started in 1945, the trial is still in the treatment stage. A compost and rock phosphate trial at Mwanhala showed a 35 per cent and 67 per cent increase in maize yield over control where three and six tons of compost was applied, and a 69 per cent and 68 per cent increase following applications of 150 lbs. and 300 lbs. of rock phosphate. A ridging trial at Mwanhala gave no significant results, but a visual comparison of the crop showed striking advantages in respect of tie-ridging. At Tumbi experiments on paddy showed that there was no significant difference in yield in most years between Sena and Afaa varieties where these are irrigated, but without irrigation Sena is superior to Afaa in a dry year, and Afaa is superior to Sena in a wet year. In the method of planting paddy, six seeds per hole was superior to transplanting, which in turn was superior to broadcasting.

Seed production continued to be an important function of the two stations, and for this purpose sixty-six and sixty-three acres at Mwanhala and Tumbi respectively were planted to various crops. The demonstration of better farming methods and the advantages of using tools and implements has resulted in many local cultivators being assisted in the purchase of agricultural implements including sixty-seven ploughs and six wheelbarrows.

In addition to the two stations at Mwanhala and Tumbi there were other experimental observation and demonstration plots in the Western Province. A large-scale field trial was laid down at Usagari to observe the value of a dressing of silicophosphate at the rate of 1½ cwts. per acre. This trial was not laid out according to the usual procedure, but was superimposed on existing native cultivated land. Strips, fifty paces wide and divided into lengths of fifty paces each (giving approximately half acre plots), were laid out across cultivated land, and where an area of bush was encountered the strip was made to change direction to follow cultivated land. The silicophosphate was spread at the rate of ¾ cwt. per half acre "plot" irrespective of the stage of development of the crop, or whether the plot had been planted. Actually 95 per cent

of the strips were under crops either before or after application of the fertilizer. The strips were inspected at frequent intervals, but at no time was any difference visible between the manured and the adjoining unmanured crops either in earliness, colour, robustness, or any other feature. The estimation of crop yields presented difficulties as each plot contained up to six different crops growing together at different stages of development. A modified method of random sampling was adopted. The time was chosen when the particular crop was ready for harvest and the crop weighed in such form as could be handed back to the owner without loss to him. Maize was weighed as cobs in the sheath, groundnuts as pods, and sorghum as heads. Thirty samples of one hundred square feet were made of each crop. Plots were selected from the map where the crop to be sampled was dominant. Then the sampling area was selected at random as "X" yards from the corner peg, and one sample area inside the manured strip and one adjacent area outside the strip harvested and weighed. Only maize, sorghum (Wiru) and groundnuts were sampled. Cassava sampling was impracticable and all other crops were present only as minor members of the mixture. The results, however, gave no significant differences as between manured and unmanured samples. In view of the possible residual effect of the silicophosphate dressings similar sample determinations of yields within and without the manured strips will be carried out for at least another year. Elsewhere there were bean observation plots comparing various haricot bean varieties, showing "Burka" to be the best, and "Cambridge Countess" the poorest in performance. A small cotton observation plot was also maintained at Zongomera (Kahama). Demonstration plots of good and bad farming were laid out at thirteen Native Authority headquarters in the Tabora District, the good farming plots including manuring, tie-ridging and early weeding.

Mahiwa Rice Station.—Work on the rice experimental station at Mahiwa in the Southern Province had to contend with a severe drought which reduced the amount of water available in the water furrows and delayed transplanting. The paddy crop, however, yielded about a ton an acre, which was a great improvement on results obtained by local native cultivators. In order to obviate a recurrence of such water shortage a new furrow and a new dam was constructed during the year.

The experimental work on spacing and varieties was inconclusive owing to the great soil differences on the experimental area. Seed production of other crops also fared badly this year and only cowpeas and bonavist beans gave any reasonable returns.

Development on the station included the building of a rest house and kitchen, a rat-proof grain store, an office block with poison and tool stores, a cattle byre and two headmen's houses.

Onion Experiments.—The results of the onion experiments carried out by the Agricultural Officer, Moshi, are summarized as follows:—

(a) The Chagga method of cultivation (flat beds) was, as in previous years, superior to the other methods tried, namely Indian (two rows of onions on 18" ridges) and Bermuda (single rows on 14" ridges).

(b) Close spacing (4½ inches between rows) as practised by the Chagga gave, as in 1945, a higher yield of onions than the wider spacings of 6" and 7½" between rows.

(c) Tartar emetic spraying underneath against thrips in two localities was ineffective, the tartar emetic failing to suppress the severe infestation of thrips brought in from the nurseries.

(d) Despite the severe and general infestation of thrips early application of sulphate of ammonia up to 27 days after transplanting gave enhanced yields but later applications showed little advantage over unmanured plots.

Applications of one cwt. of sulphate of ammonia per acre appeared to be equally as effective as two cwts. while application of three and four cwt., gave but slightly better yields. Consolidation of the manurial results of all experiments may be summarized as follows, where sulphate of ammonia costs Shs. 19/- per cwt. in Moshi :—

	Tons dry onions per acre	% of Control	Value at Shs. 7/- per frasila	Increase
			Shs.	Shs.
Control	2·63	100	1,151	—
1 cwt. Sulphate of Ammonia per acre ...	3·55	135	1,553	402
2 cwt. Sulphate of Ammonia per acre ...	3·71	141	1,623	472

It should be noted that Chagga onion plots only average about one-tenth of an acre, so that in a year such as 1946 an expenditure of Shs. 2/- on sulphate of ammonia would have raised the income from onions by Shs. 40/-.

(e) The severity of the thrips attack may be judged by comparing the overall average yields of the 1942 and 1945 experiments with those of 1946, when a more liberal use was made of sulphate of ammonia.

1942	...	6·52 tons per acre.
1945	...	6·89 „ „ „
1946	...	3·08 „ „ „

Wheat Experiments.—Three experiments were designed in co-operation with the Agricultural Officer seconded to the Northern Province Wheat Scheme and laid out and planted on land provided by Mr. A. Kunzler on farm number 186/2/3 Ngare Ol Motony. They consisted of :—

(i) a variety trial of eight varieties, four of them being varieties which had already been grown locally for some years, and the remainder varieties which had recently been introduced from Kenya but which had shown promise in the Wheat Scheme trials;

(ii) a time of planting, variety and seed rate trial of three proved varieties;

(iii) observation plots of six varieties which had recently been introduced.

Owing to the difficult weather and bird damage the results were inconclusive and only the earliest planted plots were harvested and threshed separately. One fact, however, was demonstrated, which was that whatever the season it pays to plant as early as possible.

Methoxone Weed Killer Experiments.—It was found that concentrations as weak as 0·5 per cent were effective in eliminating the soft weeds in maize and coffee; but that strengths of over two per cent were ineffective in eradicating grass weeds such as *Aristida*, and particularly couch grass and nut grass. While coffee withstood the effects of the weed killer, maize, beans and sweet potatoes succumbed.

Re-grassing Experiments.—At the request of the Director of Civil Aviation a series of experiments was laid down by the Agricultural Officer, Moshi, on the Moshi Aerodrome to compare different grass species, different spacings, the effect of disc harrowing, rolling and mowing, the effect of early and late burning, and the value of selective weeding. The unfavourable distribution of the rains interfered with the experiments so that a number of treatments could not be applied and were postponed until 1947. The following grasses were tried :—

Uru Grass (fine *Cynodon dactylon*) ; Star Grass (common *C. dactylon*); Giant Star Grass (*Cynodon plectostachyum*); Giant Star Grass (Amani strain); African Foxtail (*Cenchrus ciliaris*); Rhodes Grass (*Chloris gayana*); Couch Grass (*Digitaria scalarum*) ; *Bothriochloa insculpta* and *Eriochloa trichopus*. The best cover was given by Uru Grass, but as this is a lawn type of grass the common variety of *Cynodon dactylon* is the more likely to survive over a period of years under aerodrome runway conditions. The most successful and economical spacing for common Star Grass was 18 inches by 18 inches. The Rhodes Grass, African Foxtail and *Bothriochloa* made good growth but they all require disc-harrowing, rolling and mowing at the appropriate seasons to prevent too thick and erect a growth.

Morogoro Farm.—This farm did not carry out any specific trials, but observation plots and the production of maize seed gave some interesting information. The average yield from the three varieties of maize grown was seven bags per acre, whereas the average yield on non-native estates in the district for the same season was three-quarters to one bag per acre. As the part of the farm growing this crop had received no manuring or irrigation, and as the maize was a second arable crop after a three years grass ley, the superior yields are thought to have been due largely to such a system of alternate husbandry.

Six Uganda short-term sorghums were planted in conjunction with local varieties, both in December 1945 and at the beginning of the long rains in March. The short rains plantings showed, with the exception of variety T.15, that there was little to choose between the local and the Uganda varieties. The long rains plantings gave 3 to $3\frac{1}{2}$ bags per acre for the local varieties, and less than half a bag per acre for the Uganda varieties.

Cassava strains selected at Amani for resistance to Mosaic and Brown streak all proved to be better yielders than the local variety, but in some cases the palatability was poor.

An important function of the farm is the provision of budded citrus planting material as well as other fruit trees and ornamental plants. The nursery was extended and re-organized, and during the year some 1,120 citrus plants, 613 fruit trees and 731 ornamental plants were sold.

Central Province Seed Farms.—Three seed farms are maintained in the Central Province, one at Dodoma, one at Igugunu (Singida) and one at Kondoa Irangi. These farms are financed by Departmental and Native Treasury funds and their main functions are to provide seed of improved varieties of various food crops for distribution in the respective districts. Owing to shortage of staff it was not possible to continue with the various cultivation, spacing and variety trials which had been conducted at Dodoma during the previous three years, and all the Dodoma Farm arable land was utilized for the production

of nearly 8 tons of grain seed, mostly Dobbs sorghum and awned bulrush millet. The Dobbs yielded at the rate of 800 lbs. per acre, a very favourable yield in view of the extremely poor distribution of rain, and thus a demonstration of the value of manuring and ridge cultivation. In Singida and Kondoa the crops were virtual failures on account of the even poorer rainfall experienced there.

Southern Highlands Ripping Trials.—During a visit to the Southern Highlands Province by the Soil Chemist, Amani, in 1945, it was suggested that the generally low fertility status of the soils might be improved by breaking up the land and applying lime and phosphates. Three trials were therefore laid down at Mufindi, Rungemba and Dabaga, each of approximately one hundred acres in extent, and carrying various treatments combining ripping with a Killifer ripper to a depth of fourteen inches, and the application of lime, rock phosphate, or silicophosphate in various proportions. Except on two plots at Dabaga, no crops are being planted, it being the intention to allow the natural cover to remain for a period of a few years to show up in the vegetation and by soil analysis whether any improvement had been obtained. The only observation to report to date is that on all ripped plots the vegetation remained green longer and new foliage appeared earlier than on the control plots. The grass cover up to the present is less on the ripped plots, and no pioneer grasses had as yet established themselves.

Lushoto Farm.—As has already been mentioned elsewhere, importations of potato varieties immune to some of the strains of blight (*Phytophthora infestans*) are being multiplied at the Lushoto Farm. In addition to the variety 914a (91) imported in 1945, eight other varieties were imported in 1946 :—

653d (22), 833b (98), 834c (29), 835a (4), 914b (52), 931b (5), 1253a (25), 1256a (23).

All nine varieties were bred by the Scottish Society for Research in Plant Breeding, and seven of these have proved to be immune to the local strain of blight. Of these seven, three (914a, 914b and 833b) have shown themselves to be high yielders and also reasonably free from other diseases.

Local and imported blight-susceptible varieties of potatoes were also grown for routine observations, as well as a collection of twenty-two varieties of *Solanum andigenum* hybrids taken over from Amani. There is nothing of interest to report from these, and a great many of them will be discarded.

Pangani Coconut Seedling Nursery.—Transplanting of the one thousand and three hundred selected coconut seedlings now in a nursery at Pangani, had to be delayed owing to shortage of labour, but the site of the plantation had been cleared and most of the holes dug.

COUNCILS, BOARDS AND COMMITTEES

The Director of Agriculture and of Agricultural Production is also Sisal Controller, and, apart from being a member of the Executive Council and of the Legislative Council, he is Chairman of the Sisal Board, the Tea Board, the Coffee Board, the Cotton Board and the Songea District Native Tobacco Board. He is a member of the Economic Control Board, the Railways and Ports Council, the Labour Board and the Editorial Board of the *East African Agricultural Journal.*

PUBLICATIONS—1946

The following phamphlets were published by the Department during 1946 :—

Pamphlet No. 44.—Twelfth Annual Report of the Coffee Research and Experimental Station, Lyamungu, Moshi, 1945.

The following leaflets were published by the Department during 1946 :—

Entomological Leaflet No. 20.—Entomologist's Report, 1945.

Articles sent to the Editor, *East African Agricultural Journal* for publication during the year 1946 were as follows :—

April Issue:

"The Use of Transport and Poison Bait in the Locust Campaign", by R. J. M. Swynnerton.

"Results of Some Wheat Experiments in the Northern Province, Tanganyika Territory", by N. R. Fuggles-Couchman.

"Observations on the Spacing of Sisal", by G. W. Lock.

July Issue:

"Siege Farming in Malta", by R. J. M. Swynnerton.

October Issue:

"Note on Vegetative Propagation of *Coffee Arabica*", by S. M. Gilbert.

"Tie-ridging (with Special Reference to Semi-arid Areas)", by A. N. Prentice.

"Rations for African Labour", by R. W. R. Miller.

"Improvement of the Coconut Industry on the Tanga Coast", by R. J. M. Swynnerton.

"Effects of Anti-malarial D.D.T. Spraying on Crops", by A. Pitcairn.

FINANCE

The financial provision for the period 1st January, 1946, to 31st December, 1946, together with the actual expenditure is given below.

The Empire Cotton Growing Corporation continued to meet the personal emoluments of the three Empire Cotton Growing Corporation officers posted to this Territory for cotton investigation, and the salary of one Ginnery Inspector amounting to £600 was again provided by the British Cotton Growing Association.

The financial assistance afforded by the councils of the above two bodies is again gratefully acknowledged.

The Agricultural Development Fund provided £89,570 for various projects, as detailed below, only some of which were commenced.

The following are the estimates of direct revenue secured by the Department in 1946, compared with revenue collected during the previous two years :—

	£ 1944	£ 1945	£ 1946
Bukoba Coffee Grading Fees	2,940	2,260	1,208
Sisal Tax	27,410	65,125	*22,326
Coffee Tax	7,340	6,822	4,627
Cotton Tax	3,340	4,030	2,222
Pyrethrum Tax	440	780	749
Tea Tax	470	675	794

*The reduction in the revenue derived from the Sisal Tax was due to revision of this tax from Shs. 11/50 per ton to Shs. 3/50 per ton as from 1st January, 1946.

Details of the provision and expenditure are given in the following table :—

	Provision for the period 1/1/46 to 31/12/46		Expenditure for period 1/1/46 to 31/12/46
PERSONAL EMOLUMENTS :	£		£
Administrative	11,930	...	10,035
Scientific Staff	7,110	...	4,426
Provincial and Experiment Farm Staff	73,010	...	62,774
Total Personal Emoluments ...	£92,050	...	£77,235
OTHER CHARGES :			
Travelling (including Railway Fares and Freights, Travelling and Transport Allowances, Transport and Maintenance and Running of Motor Vehicles)	19,500	...	16,653
Upkeep of Experimental Station and Plantations (including part Coffee Research Station), Contribution to Native Treasuries' Seed Farms and Minor Improvements to Agricultural Stations	18,630	...	16,750
Upkeep of Agricultural Training Centres and Ploughing Schools	600	...	186
Purchase of Planting Materials	150	...	53
Plant Sanitation	130	...	63
Purchase of Tools, Implements and Scientific Equipment	2,700	...	620
Expenditure on Cotton Tax Services	4,500	...	3,931
Increased Food Production	5,700	...	4,185
General Expenditure (including Bicycles, Books of Reference, Contingencies, Electricity, Stationery, Tents, Typewriters and Uniforms)	3,320	...	2,820
Agricultural Development Special Services ...	250	...	320
Expenses Land Settlement Board	200	...	30
Total Other Charges ...	£55,680	...	£45,611
SPECIAL EXPENDITURE :			
Improvement of Copra Industry	300	...	192
Bukoba Coffee Mulching	500	...	253
Citrus Industry—Grading Inspection ...	200	...	50
Contribution to Cost of Seed Specialist ...	400	...	—
Haricot Bean Production	1,000	...	775
Onion Nursery, Mbulu	1,050	...	763
Sisal Experimental Station, External Field Trials, Capital Expenditure	2,000	...	170
Maize Planting Grants	16,000	...	18,975
Purchase of Motor Vehicles	4,500	...	3,952
Purchase of Two Diesel Engines	300	...	—
Pig Production, Iheme Agricultural Station ...	250	...	29
Purchase of Two Maize Harvesters	600	...	—
Labour Camp, Sisal Experimental Station ...	450	...	434
Purchase of Experimental Sisal Cutter ...	100	...	114
Production of Nicotine Sulphate	250	...	37
Investigation of Parasite for Sisal Weevil ...	200	...	101
Purchase of Duplicating Machine	80	...	—
Equipment for Fisheries Officers	100	...	217
Soil Trials, Southern Highlands Province ...	750	...	725
Total Special Expenditure ...	£29,030	...	£26,786

Agricultural Development Fund

	Provision for the period 1/1/46 to 31/12/46	Expenditure for period 1/1/46 to 31/12/46
	£	£
1. Development of Rice Production, Southern Province (recurrent for five years) ...	1,170	609
2. Development of Rice Production, Southern Province (Capital)	1,000	1,331
3. Coffee Experimental Station, Bukoba (recurrent five years)	1,600	—
4. Coffee Experimental Station, Bukoba (Capital)	10,000	—
5. Agricultural Training for Indians (recurrent six years)	2,000	—
6. Agricultural Training for Indians (Capital)	8,000	4,827
7. Training of Agricultural Instructors (recurrent seven years)	7,000	1,810
8. Training of Agricultural Instructors (Capital)	25,000	3,705
13. Cotton Experimental Station, etc., Ilonga (Capital)	17,000	992
14. Extension of Ukiriguru Experimental Station (Capital)	11,800	2,098
15. Houses for Field Officers (Capital) ...	5,000	1,930
18. Soil Conservation	—	74
19. Development of Tumbi and Mwanhala Stations	—	255
20. Rehabilitation of Mlalo Basin	—	245
21. Dams for Rice Growing	—	204
22. Ukiriguru Malarial and Clearing Scheme ...	—	361
23. Cowshed at Lyamungu	—	731
24. Multiplication of New Potato Varieties ...	—	69
25. Houses for Agricultural Instructors at Kahe, Moshi	—	215
27. Labour Lines, Ukiriguru Experimental Station	—	13
	£89,570	£19,469

In addition to the provisions made under the Departmental head and under Agricultural Development Fund, the following provisions for services connected with "agriculture" were made in the Territorial estimates for 1946 :—

	£
Anti-Locust Measures	52,000
Loans from Territory's Funds :	
Agricultural Crop Loans	25,000
Agricultural Machinery Loans	5,000
Subventions to :	
Imperial Institute of Entomology	500
Imperial Institute of Mycology	250
Imperial Agricultural Bureau	390
Imperial Institute	400
Imperial College of Tropical Agriculture, Trinidad	500
Imperial Economic and Shipping Committees	90
Coffee Section of the British Empire Producers Organization ...	155
International Locust Control Scheme	2,400
East African Agricultural Research Institute	5,510
Grants to :	
Sisal Board	46,565
Coffee Board	6,570
Pyrethrum Board	1,230
Tea Board	700

SECTION VI.—LEGISLATIVE CHANGES IN 1946 AFFECTING AGRICULTURAL INDUSTRIES

Coffee.—(1) The Native Coffee (Control and Marketing) Ordinance, 1937, was amended by Ordinance No. 4 of 1946 which made provision for every Board established under section 3 of Ordinance No. 26 of 1937 to be a body corporate having perpetual succession and a common seal and capable in law of being sued, and of purchasing, holding and alienating land and other property.

(ii) Rules were also enacted under the above Ordinance No. 12 of 1937 entitled the Native Coffee (Control and Marketing) (Accounts) Rules, 1946, whereby the accounts of the Moshi Native Coffee Board shall be kept on a commercial system and shall be audited by a firm of qualified accountants.

Cotton.—An order under the Cotton Ordinance, 1937, and cited as the Cotton (Quarantine Area, Southern Province) Order, 1946, was enacted stipulating that no cotton shall be grown in the area included in the whole of the Kilwa and Liwale districts and those parts of the Lindi and Masasi districts which are north of the Lindi-Songea main road. This measure was taken following the discovery of red bollworm in the Mikindani District, and has as its object the establishment of a quarantine area between the cotton growing areas in the Southern Province and the cotton growing areas on the Rufiji and the rest of the Territory.

Rice.—An order was published under the Defence Regulations, 1939, the Defence (Hand-Hulled Rice) Order, 1946, which prohibited the sale of the purchase of hand-hulled rice at any appointed selling place.

Sisal.—(i) The recruitment of all native labour for the sisal industry was organized by the establishment of the Tanganyika Sisal Growers' Association Labour Bureau, and the Sisal Plantations (Recruitment Restriction) Regulations, 1946, were enacted under the Master and Native Servants (Recruitment) Ordinance, 1946, whereby no sisal plantation could employ native labour other than those recruited by the Labour Bureau.

(ii) The Sisal (Cess) Order, 1946, was enacted under the Sisal Industry Ordinance, 1945, raising a cess of three shillings and fifty cents per every ton of sisal produced in and exported from the Territory.

Tobacco.—(i) The cess payable on native tobacco sold by the Ngoni-Matengo Co-operative Marketing Union Limited was raised to thirty-four shillings for every one hundred kilograms net weight under the terms of the Native Tobacco (Songea Board) (Cess) Order, 1946.

Increased Production of Crops.—The Increased Production of Crops Ordinance, 1944, which provided for guaranteed prices, breaking grants for new land brought under food crops, minimum guaranteed returns, and legalized District Production Committees, was extended by Proclamation to remain in force until 31st December, 1950.

CONCLUSION

It is a great pleasure to express appreciation for another year of loyal service rendered by the staff, and to congratulate Mr. S. M. Gilbert on the award of the O.B.E., and Mr. J. G. M. King on the award of the M.B.E.

The thanks of the Department are accorded to all the various members of Boards and Committees that assist it in its work, and the help given by all members of the Service in other departments, especially that of the Provincial Administration, is also gratefully acknowledged. Furthermore, the co-operation and generous help afforded by the Departments of Agriculture in the neighbouring Territories and by the East African Agricultural Research Institute, Amani, is similarly appreciated and acknowledged.

R. W. R. Miller,
Director of Agriculture

Dar es Salaam, 1947.

Appendix I

LIST OF EUROPEAN STAFF AS ON THE 31ST DECEMBER 1946

Director: R. W. R. Miller, C.M.G., B.A. (Cantab.), Dip. (Agric.) (Cantab.), Dar es Salaam.

Deputy Director: C. E. J. Biggs, B.Sc. (London), Dip. (Agric.) (Wye), Dar es Salaam.

Chief Scientific Officer: S. M. Gilbert, B.Sc. (Agric.), N.D.A., on leave pending retirement.

Acting Chief Scientific Officer: F. R. Sanders, B.A. (Hons.) (Cantab.), C.D.A., Lyamungu, Moshi.

Entomologists: W. F. Jepson, O.B.E., B.Sc. (Lond.), A.R.C.S., Ph.D., Morogoro; F. B. Notley, M.Sc., A.I.C.T.A., Lyamungu, Moshi*.

Plant Pathologist: G. B. Wallace, B.Sc., Ph.D. (Edin.), Lyamungu, Moshi.

Chemist: H. B. Stent, M.Sc. (Tech.) (Vict.), A.I.C., A.I.C.T.A., Nairobi.

Senior Agricultural Officers: D. Sturdy, O.B.E., M.A. (Agric.) (Cantab.), Seconded to Jamaica; H. P. Smart, B.Sc. (Agric.) (South Africa), A.I.C.TA., Dar es Salaam; C. J. McGregor, C.D.A., Dar es Salaam; G. W. Lock, O.B.E., N.D.A., N.D.D., Ngomeni, Tanga; J. V. R. Brown, B.Sc. (Agric.), Moshi; A. H. Savile, C.D.A., A.I.C.T.A., Morogoro*; N. V. Rounce, C.D.A., A.I.C.T.A., Mwanza; A. S. Stenhouse, B.Sc., B.Sc. (Agric.) (Aberd.), N.D.A., Lindi; R. D. Linton, B.Sc. (Agric.) (Belfast), A.I.C.T.A., Lushoto; A. Pitcairn, Dip. Agric. (Edin.), Tabora*; R. B. Allnutt, B.Sc. (Agric.) (London), Dodoma.

Agricultural Officers: H. Marsland, B.Sc. (Edin.), N.D.A., seconded to Economic Control Board; T. C. Cairns, B.Sc. (Edin.), Arusha; J. K. Robertson, B.Sc. (Agric.) (Aberd.), A.I.C.T.A. Lyamungu, Moshi; F. W. Thomas, C.D.A. and C.D.F. (Glas.), Iringa; J. R. Curry, N.D.A., seconded to Malaya; N. R. Fuggles-Couchman, B.Sc. (Lond.), C.D.A., (Cantab.), A.I.C.T.A., on leave*; D. Thornton, B.Sc., on leave; J. M. G. King, M.B.E., C.D.A. (Wye), A.I.C.T.A., seconded to Cambridge University; J. C. Eyre, B.Sc., (Agric.) (Stell.), D.I.C., seconded to Palestine; H. Gillman, M.Sc., A.I.C.T.A., Dodoma; T. H. Marshall, Cert. Kew., F.R.H.S., Mbeya; R. J. M. Swynnerton, M.C., B.A. Dip. Agric. (Cantab.), A.I.C.T.A., Moshi*; C. Mansfield, Dip. Agric. (Wye), Shinyanga*; M. Lunan, B.Sc., A.I.C.T.A., Tabora*; J. B. Clegg, B.A. (Agric.), Lushoto Malindi; J. T. Purvis, B.Sc. (Agric.), on leave; T. S. Jervis, Bukoba; R. W. Collett, Songea; H. Doggett, B.A. (Cantab.), A.I.C.T.A., Tanga; H. L. Brett, Mbulu*; F. E. Luscombe, B.Sc. (Agric.), A.I.C.T.A., Lindi; E. T. Ward, C.D.A., Dodoma; A. H. B. Childs, M.R.A.C., Q.A.L.A.S., Iringa*; J. D. Hunter-Smith, B.Sc. (Agric.), Morogoro; C. G. Glegg, Dip. Hort. (Wye), Mwanza*; D. Morrison, B.Sc. (Agric.), Dip. Agric. (Cantab.), Mwanza; J. S. Gunn, B.Sc. (Agric.), Moshi. Four vacancies.

Tobacco Officer: J. H. McGregor, Iringa.

Agricultural Officer (Ginnery): R. I. Butler, Mwanza.

Senior Agricultural Assistants: W. C. Clarke, seconded to Montserrat; G. S. Brown, Singida; L. Leslie-Moore, Handeni; W. Sibly-Warne, F.R.H.S., Songea; A. A. E. Weirich, Bagamoyo; R. B. Silcock, on leave.

Agricultural Assistants: A. Taylor, Kilosa; R. Seager, Kasulu; B. R. D. Eccles, Tukuyu; E. Pienaar, Ngomeni*; B. E. M. Petit, Same; V. Allen, Mwanhala, Nzega; J. C. van Schoor, Utete; G. H. Attwell, B.Sc., Ukiriguru; D. R. A. Goode, Biharamulo; K. Johanson, Masasi; A. M. Pienaar, Lyamungu*; M. L. Reiner, Kondoa-Irangi; J. M. van Dyk, Kisserawe; T. W. H. Dore, Kilwa*; T. J. Taverner, Lushoto*; K. B. Louwrens, Iringa; J. I. Thomson, Kilosa*; A. E. Favell, Bukoba; J. F. Tregarthen, Ukiriguru*; R. J. Mulcahy, Kigoma. Ten vacancies.

Field Officers: W. Isemonger, Manyoni; G. N. B. Pletts, Mahenge.

Field Assistant: H. J. P. Nelson, Tabora.

Temporary Scientific Assistant: Mrs. M. Wallace, Lyamungu.

Office Superintendent: D. F. T. Brown, seconded to Mauritius; K. C. Pearson, Dar es Salaam.*

District Production Committees:
Executive Officers: W. E. H. Scupham, C.M.G., M.C., Iringa; J. W. Haylock, Moshi.

*Served with the Forces during the War 1939-1945.

LIST OF PUBLIC GINNERIES LICENSED IN 1946

Province and District	Locality	Number of Gins		Licensees
		Saw	Roller	
Eastern:				
Morogoro	Morogoro ...	—	22	Tanganyika Cotton Co., Ltd.
,, ...	Mikesse ...	—	20	East African Cotton Co., Ltd.
,, ...	Ngerengere ...	—	11	Liverpool Uganda Co., Ltd.
,, ...	Duthumi ...	—	20	Tanganyika Cotton Co., Ltd.
,, ...	Turiani	—	16	do.
Kilosa	Kilosa	—	18	Juma Haji.
,, ...	Rudewa ...	—	22	Tanganyika Cotton Co., Ltd.
,, ...	Msowero ...	—	16	Msowero Ginnery, Ltd.
Bagamoyo	Mandera ...	—	20	Liverpool Uganda Co., Ltd.
Rufiji	Kilimani ...	—	12	East African Cotton Co., Ltd.
,, ...	Msomeni ...	—	15	do.
,, ...	Longeloge ...	—	12	do.
Ulanga	Kiberege ...	—	12	Vithaldas Haridas and Co., Ltd.
,, ...	Malinyi ...	—	12	do.
Southern:				
Lindi	Mtua	—	14	Kikanda Cotton Trading Co., Ltd.
Kilwa	Kikanda ...	—	10	do.
Tunduru	Tunduru ...	—	14	do.
Mikindani	Mikindani ...	—	4	Mikindani Cotton Co., Ltd.
Tanga:				
Korogwe	Korogwe ...	—	25	Moshi Trading Co., Ltd.
,, ...	Sindeni	—	11	do.
Northern:				
Moshi	Moshi	—	24	do.
Mbulu	Idulu	—	12	Jamal Ramji and Co., Ltd.
Lake:				
Mwanza	Mwanza ...	—	25	Nakasero Commercial Corp., Ltd.
,, ...	Murutuoguru ...	1	24	Ladha Meghjee and Sons, Ltd.
,, ...	Ihale	—	14	Mwanza Cotton Trading Co., Ltd.
,, ...	Bukumbi ...	—	15	Bhagwadji Sunderji and Co.
,, ...	Nassa	—	20	Sikh Ginners.
,, ...	Buchosa ...	—	14	Vithaldas Haridas and Co., Ltd.
Kwimba	Pambani ...	—	17	Pambani Limited.
,, ...	Nyambiti ...	—	20	Lake Province Cotton Co., Ltd.
Musoma	Mugango ...	—	20	do.
Maswa	Malampaka ...	—	12	Bhagwanji Sunderji and Co.
,, ...	Luguru ...	—	14	do.
Shinyanga	Usogore... ...	—	14	do.

Appendix III

COTTON STATISTICS: SEASON 1946

(*By Districts*)

Districts	No. of Growers	Quantity of seed distributed in tons	Quantity of seed-cotton marketed			Approximate total cash revenue to natives. Shs.
			1st Grade tons	3rd Grade tons	Total tons	
Lake Province:						
Musoma...	9,454	194	1,464·24	150·21	1,614.45	464,743
Mwanza...	78,000	2,100	14,419·61	166·21	14,585·82	4,337,590
Kwimba...	31,000	775	3,960·33	64.54	4,024·87	1,192,753
Maswa ...	25,000	800	1,394·09	44·76	1,438·85	418,280
Shinyanga	32,000	625	806·79	67·27	874.06	248,706
Tanga Province:						
Same ...	1,116	67	67.81	28·53	96·34	28,601·14
Korogwe	1,132	25	18·80	5·50	24·30	7,603·94
Handeni...	5,078	70	63·80	17·58	81·36	24,438·01
Northern Province:						
Arusha ...	500	4	6.50	2·00	8·50	2,696·39
Moshi ...	2,500	26	126·50	27·00	153·50	49,836·75
Mbulu ...	1,547	10	13·50	10·50	24·00	5,795·11
Eastern Province:						
Kilosa ...	6,000	100	546·00	167·00	713·00	212,000·00
Morogoro	7,400	100	716·00	145·00	861·00	270,000·00
Mahenge...	9,300	112	739·00	147·00	886·00	244,200·00
Bagamoyo	7,450	102	327·00	67·00	394·00	120,000·00
Uzaramo	650	11	10·00	3·00	13·00	3,400·00
Rufiji ...	3,000	80	130·00	21·00	151.00	45,400·00
Southern Province:						
Kilwa ...		52	5·11	2·85	7.96	
Lindi ...		74	18·37	1·36	19·73	
Masasi ...		21	2·99	·14	3·13	46,981·85
Tunduru...		48	61·35	·96	62·31	
Mikindani		51	53·63	13·30	66·93	
Total ...	221,127	5,447	24,951·42	1,152·71	26,104·11	7,723,025·19